Cumulus Conference Proceedings

Nantes, France 2025

ethical leadership
a new frontier for design

L'ÉCOLE DE DESIGN Nantes Atlantique

Cumulus Association

Ethical Leadership: A New Frontier for Design
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Ethical Leadership: A New Frontier for Design

Cumulus Conference Proceedings Nantes 2025

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L'ÉCOLE DE DESIGN Nantes Atlantique

Cumulus Association

FOREWORD

Ethical Leadership: A New Frontier for Design

Christian Guellerin

Executive Director, L'École de design Nantes Atlantique

Former President, Cumulus Association

Emmanuel Levinas writes: "Morality makes us feel sorry for those who are hungry, Ethics obliges us to feed them. ". Ethics requires action, it is no longer a question of think- ing about the world or drawing it as one would like, it is a question of building it. Beyond his position as a giver of meaning, the designer becomes a builder and symbolically returns to the origins of Applied Arts and the work of the hand. How to build tomorrow is the key question.

The place of the designer in tomorrow's organizations is central and decisive for structures that think about their future. We must act to help them design, produce and sell differently. They will be forced to do so by the standards which will undoubtedly be promulgated at a time when political leaders begin to legislate to limit carbon production or are tempted to limit certain industries for the benefit of others

They will also be forced to do so by changes in consumption. The consumer will want to obtain guarantees of responsibility from companies. The consumer will become a citizen-consumer.

The development is interesting because it will revolutionize the UX design approach, which could become an approach much more focused on the consumer who has become a citizen. UX could be re- placed by CX design. The "consumer experience" devotes both the experience, the sense but also consumption which becomes acceptable as soon as it is reasoned. CX design could replace marketing focused solely on profitability

Finally, industrial requirements will change completely in nature, the inability to rely on the renewal of markets to order its activity, will force all companies to ask themselves the question of moving

from product to service. Dishwasher manufacturers will have to move from selling a machine to marketing "hours of operation" of the machine. Designers are called upon to occupy strategic positions because industrial and commercial models are shaken up by innovation and the duty to change all paradigms.

The concept of ethical leadership

Ethics obliges us to act. Design thinking has only laid the foundations for thoughtful design. Nothing will remain except memories of post-it meetings during which everyone feels free of their creativity. Without a scientific basis other than a drawing to justify that creative thinking went in all directions, and therefore had none, it will not be able to survive except as a recreational step in the emergence of the designer towards strategic and management functions.

The role of Design Schools in learning and training must change in nature and prepare students to become entrepreneurs of their own idea. It is a profound evolution of the programs that needs to be done. Most programs are focused on learning techniques, while these will be assumed tomorrow by intelligent robots. Thinking that robots will not be able to create is a mistake. We will have taught them to do it and to take our place in all technical activities. It remains for humans to take the position of manager and facilitator of what machines will be able to do. This is the challenge of tomorrow's design positioning. If the design has become strategic and if the technical tasks are assumed by Artificial Intelligence, if it is a question of giving meaning to science, technology and/or marketing and finance, then design becomes the key function. But this will only be possible if design schools profoundly change their program towards more professionalization, understanding of the economy, organizations and the levers of their development. The challenge of hybridizing disciplines between science, humanities, business and design is becoming imperative. It is the objective towards the strategic functions that should be ordered. Student designers can no longer just create and leave their creation to others, it is about entrepreneurship. They are called to become the leaders of this profound economic revolution more moral responsibility and sobriety. They must be leaders on the condition that they are aware of it and that schools allow them to objectify this result. Or design will only remain on the margins while top-strategic positions are largely open to them. This is the discussion we wanted to open in Nantes by welcoming the Cumulus spring conference 2025 "Ethical Leadership: A New Frontier for Design", as documented in these proceedings.

FOREWORD

Celebrating 35 Years: Design for a Planet-Centered Future

Lorenzo Imbesi

Full Professor, Sapienza University of Rome
President, Cumulus Association

The Cumulus Nantes Atlantique 2025 Conference represented a landmark moment in the history of our association—a celebration of 35 years of global design education collaboration, and a bold reimagining of design's role in addressing the pressing challenges of our time. Hosted in Nantes, a city that embodies the spirit of innovation and cultural richness, and graciously welcomed by L'École de Design Nantes Atlantique, this gathering brought together more than 500 participants from across the world, creating an unprecedented space for dialogue, reflection, and transformation

This anniversary conference was not merely a commemorative event, but a pivotal moment of transition and renewal. At its heart was the unveiling of the new Cumulus Design Declaration - a transformative document born from years of collaborative co-design processes involving our entire global network. This declaration articulates our evolved vision, marking a fundamental shift from human-centered to planet-centered design. It recognizes our profound interdependence with all life on Earth and challenges us to transcend anthropocentric paradigms, embracing a holistic perspective that acknowledges the complex relationships between human and non-human entities in shaping sustainable futures.

The conference provided a fertile ground for exploring critical dimensions of contemporary design education and practice. Through keynote presentations, panel discussions, workshops, and exhibitions, participants engaged with urgent questions about sustainability, equity, and the ethical responsibilities of designers in an era of climate emergency,

social upheaval, and technological transformation. The discussions reflected a commitment to redefining design's foundational principles—its starting points, objectives, and values - in ways that respond to the interconnected crises of our planet.

Particularly significant was the Design Cultures for Peace initiative and the Gaza resolution, unanimously voted by the General Assembly. This historic decision demonstrated our community's unwavering commitment to fostering dialogue and understanding through design education, even amid geopolitical tensions and conflicts. It affirmed that Cumulus stands for more than academic collaboration—we are advocates for peace, justice, and positive change through design. In moments of global division, our association chose to unite in solidarity, recognizing that creativity and education can serve as bridges toward reconciliation and mutual respect.

The proceedings collected in this volume capture the intellectual richness and diversity of perspectives shared during this extraordinary gathering. They include theoretical explorations, innovative pedagogical approaches, speculative projects, and practical strategies that collectively point toward an expanded understanding of design's transformative potential. These contributions invite us to question established norms, embrace complexity, and imagine alternative futures where design actively contributes to ecological regeneration, social justice, and cultural understanding.

As we reflect on these 35 years of collaborative journey and look toward the future, the Nantes conference reminds us that our strength lies in our global community - in the connections we forge across geographical, cultural, and disciplinary boundaries. The legacy we continue to build together, rooted in inclusivity, diversity, and shared commitment to meaningful change, provides a foundation for addressing the challenges and opportunities that lie ahead. In a world that demands urgent action and profound transformation, design education, when practiced with care, intention, and planetary consciousness, can truly serve as a catalyst for building more sustainable, equitable, and harmonious ways of living together.

Cumulus Association

The Cumulus Association celebrated its 35th anniversary during the Cumulus Spring Conference in Nantes. It is the leading global association of art and design education and research. Cumulus represents a dynamic ecosystem for internationalization and global mobility, knowledge exchange, and collaboration in art and design pedagogy, research, and practice. The 400 Cumulus member institutions are leading the way in art and design education around the world. Originating from 71 countries, they demonstrate the importance of collaboration in a 21st century higher education landscape that is increasingly complex and global.

L'École de Design Nantes Atlantique

Founded in 1988, L'École de design Nantes Atlantique is a partner institution of the Nantes St-Nazaire Chamber of Commerce and Industry. Our institution operates under the authority of the Ministry of Higher Education and is an associate partner institution of Nantes Université, with support from local authorities, including Nantes Métropole and the Pays de la Loire regional authority. L'École de Design Nantes Atlantique is situated on the Île de Nantes in the heart of the Quartier de la Création. This unique architectural setting fosters creativity, learning, and global awareness. As a research and innovation centre, the school has created five Design Labs, platforms for research, training and innovation through design, supervised by 350 teachers and professionals ::

- Care Design Lab (health, care and social innovation)
- City Design Lab (urban and territorial change)
- Digital Design Lab (digital innovation)
- Food Design Lab (new eating habits and the food system)
- Media Design Lab (media, information, communication and entertainment)

By grouping all of its activities on the same site, in particular its research and innovation laboratories, the school has strengthened its ability to respond to the challenges of today's world: changes in lifestyles and practices, new services brought about by digital technology, changes in cities, ageing populations and attention to others, new economic models, environmental and social issues, etc.
This unique site offers a working area of 11,600 m2, including more than 1,000 m2 dedicated to manufacturing spaces and digital workshops. Structured around an agora, a central space for socialising, the environmentally designed building is located in the heart of a creative eco-system. Fortified by its 1000 corporate partners and 4000 alumni, l'École de Design Nantes Atlantique is historically linked to the professional world. It prides itself on its project-based teaching methods and offers a wide range of opportunities for companies to recruit people who are particularly sensitive to technological, societal and environmental changes: internships, apprenticeships, prospective studies, workshops, projects in partnership with companies on real-life issues, professional designers as speakers and lecturers.

To promote the cultural and creative development of its students, L'École de design Nantes Atlantique has chosen to expand to the four corners of the world. It is located in Shanghai (China), São Paulo (Brazil), Montreal (Canada), Cotonou (Benin). It has also developed partnerships with more than a hundred universities around the world to encourage its students to immerse themselves in the international scene. Each year, our international programs welcome students of some 40 nationalities to the campus.

THEME AND TRACKS

In the last three decades, the design field has seen significant transformations, marked by diversification, complexity, and integration with various sectors, including technology. Initially focused on form and function, design has expanded to drive social, ecological, cultural, and digital innovations. Two major revolutions – digital and service – have reshaped the discipline. Today, with environmental challenges and advancing AI, designers face a critical juncture, necessitating reevaluation of practices and theories. This includes adopting multidisciplinary, innovative, and ethically responsible approaches.

The 2025 Spring Cumulus Conference in Nantes welcomed more than 500 participants that have explored and exchanged during more than 3 days new design ethics through six tracks: Care, City, Food, Digital, Media, and Design & Entrepreneurship.

1 Care and Public Innovative Action Issues: Managing new ethics of public design

Care ethics aim to « mend our world » by improving relationships and enhancing democratic practices (Tronto, 1993). Over the past few decades, social designers in the UK, Scandinavia, the US, and France have developed participatory practices and public service co-production to innovate public administration and governance. This participatory shift in governance has introduced new methods for public engagement and democratic debate to advocate for justice (Di Salvo, 2022). Various analytical frameworks have been developed, focusing on creativity, innovation impacts, and stages of transformation in projects and work cultures (Salinas et all, 2024). We call for new analytical taxonomies on design for policy to evaluate contexts like hospitals, urban bodies, or community centers, ensuring elderly well-being. Our aim is to review public innovation landscapes through social, economic, and political impacts,

exploring design-led strategies, governance, and impacts through co-design practices or collaborative management, and evaluation. Designers' roles in public sector transformation and ethical leadership are ought to be highlighted (Buchanan, 2020).

Buchanan, C. (2020) What is strategic design? An examination of new design activity in the public and civic sectors. Doctoral thesis. Lancaster University, UK.

DiSalvo, C. (2022) Design as Democratic Inquiry: Putting Experimental Civics into Practice. The MIT Press.

Salinas, L., Yarrow, L., and Lagedamont, M. (2024) Critical service design for government innovation, in Gray, C., Ciliotta Chehade, E., Hekkert, P., Forlano, L., Ciuccarelli, P., Lloyd, P. (eds.), DRS2024: Boston, 23–28 June, Boston, USA. https://doi.org/10.21606/drs.2024.532

Tronto, J., 1993, Un monde vulnérable. Pour une politique du care. Paris. La Découverte

2 Regenerative City and Territorial Development: Co-designing benefits for People and Natur

The dominant model of urban and territorial development, based on infinite growth and the ever-expanding human settlements, has exceeded planetary limits, particularly in terms of climate, biodiversity, and other natural resources, and has exacerbated social inequalities (Stockholm Resilience Institute, 2022). In France, this has led to land artificialization at a rate of three to four times higher than demographic growth (Ministère de l'Écologie, de l'Énergie et de la Mer, 2017).

To address these dead-ends, transforming and regenerating existing cities is a key lever for ecological and social transition, as 80% of the cities of tomorrow already exist (Leconte, Grisot, 2022). Regenerative design aims to go beyond sustainable design principles to foster the co-evolution of natural and social systems (Blanco, 2022) and calls for systems perspectives and a territorial approach (Attia, 2016; Brown et al., 2018; Zhang, Skitmore, De Jong, Huisingh, & Gray, 2015; Cole, Oliver, & Robinson, 2013). 11

We call for contributions analyzing methodologies, processes, projects, and outcomes of design and co-design linking public authorities, urban citizens/citizen groups, and professionals such as designers, urban planners, landscape architects, architects and/or developers. It involves questioning equitable territorial development that incorporates the needs of all, including the special needs of disadvantaged populations, while promoting sustainable cities and territories (Harvey, 2012; Glasser, 2011; Gehl, 2010; Florida, 2002; Sennett, 1992). It also explores the current and emerging roles of designers for city and territory shaping and transformation that include notably regenerative design, inclusive design, nature-inspired design, resilient design, circular design, speculative design, etc.

3 Digital Ethics: From UX to Ecosystems, from AI Ubiquity to AI Acceptability

As the digital landscape rapidly evolves, designers are at the forefront of creating experiences that significantly impact individuals, societies and the environment. This track explores the ethical dimensions of digital design in this dynamic context. User Experience (UX) designers balance usability, accessibility, and privacy concerns. The ethical and environmental implications of digital ecosystems extend beyond individual interactions, addressing governance, trust, and accountability. We will explore how designers can navigate these complexities to foster ethical digital ecosystems that prioritize user welfare, environmental and societal good, showcasing frameworks and case studies that promote equity, frugality, trust, and inclusivity.

Artificial Intelligence (AI) is now ubiquitous, influencing many aspects of life. Ensuring AI's acceptability requires addressing ethical issues like bias, fairness, and transparency, its impact on labor and the environment. The development of frameworks is needed for the responsible design, development and deployment of AI technologies, including for robotics

and IoT devices, from testing AI's datasets to measuring its environmental impact.

Advancements in virtual and extended reality bring new dimensions of user engagement and unique ethical concerns, such as user safety and psychological impacts. How do we design innovative and responsible immersive experiences? This track offers a platform for critical reflection and discussions on digital ethics, inspiring designers to lead with ethical principles and shape a just and desirable digital future.

4 Food Transition: Food Serenity and Environmental Challenges

This theme calls for contributions focused on the food sector, which is undergoing a significant transition due to pressing environmental challenges. Both society and consumers bear a substantial individual, corporate, and social responsibility to future generations, necessitating the urgent embrace and initiation of this transition without further delay.

Designers play a crucial role in shifting the mindset around food consumption and production, which is the most impactful and challenging leverage point. We frame this discussion around the question: 'How can designers valorize and emphasize food serenity to contribute to environmental preservation through their methods and practices, while also ensuring that design takes a leading role in driving this food transition?

The theme of Food Serenity involves a focus on enhancing food well-being (better eating habits), embracing sobriety (such as low energy consumption, local sourcing, slow food principles, and sustainability), improving food access (through policy and food safety), and ensuring transparency (regarding the origin and production conditions, food ethics of highly processed foods, and the acceptance of alternative protein sources). »

The concept of Food Serenity challenges designers to balance individual

well-being in relation to consumption with environmental and societal responsibility. Designers working on food-related topics are imagining sense-making new food production models, driving innovative processing methods, facilitating the adoption of sustainable eating and consumption habits, and developing visions for regenerative food systems of the future. Using design methods like a transdisciplinary systemic design approach can stimulate a paradigm shift by acting on different levels: Micro (individual), Meso (companies), and Macro (public sector). In the future, this will empower designers to position their impact and take on a strategic leadership role in the food sector.

5 Informational Issues: Information and Interaction Design & Trust in Information

We are calling for contributions on the role of information and interaction design in building public trust in information and in the media (in all their forms: press, newspapers, audiovisual, social media, digital platforms) relaying this information. It examines how user experience, graphic interface and visual presentation influence the perception and understanding of information.

It also examines devices that encourage user engagement in knowledge and critical thinking, or conversely that exploit user attention and related ethical issues. It looks at how they contribute to economic and information service models. It explores the current and future roles of designers in shaping and processing information and knowledge, and how new digital product teams are being structured.

6 Design Entrepreneurship - From Designers to Leaders : Cultivating Ethical Leadership by Design-Driven Entrepreneurship

This track explores the transition of intercultural designers and entrepreneurs from « designing » to « leading. » We will investigate this evolution from hands-on design to leadership roles, and the requisite dependencies on shared understanding with greater agency in diverse co-creation networks. The track will also examine how the planet can serve as a literal and metaphorical boundary object for intersubjective understanding.

We will highlight the unique perspectives designers bring as their ethical influence increases, identifying and addressing gaps in their capacities to fulfill this new frontier. Discussions will focus on the dilemmas of maintaining creative essence while assuming leadership responsibilities, in addition to changing organizational models by ethically evolving with new tools, shared language, and creative cultures. The track encourages research on how trained designers take on leadership roles outside traditional design disciplines, particularly as they extend into entrepreneurs. We will discuss the power of purpose in designing more ethical businesses, including the levers of equitable business models, sustainable practices, and public-private partnerships.

CALL FOR PAPERS PROCESS

A call for papers & contributions opened to the design community early September 2024, for researchers, doctoral candidates, educators and design practitioners.

Track	Abstracts received	Abstracts selected	Final submissions	Final submissions selected	Selectivity rate
Care and Public Innovative	116	66	50	46	40%
Regenerative City	121	54	39	37	31%
Digital Ethics	136	62	40	36	26%
Food Transition	44	29	20	20	45%
Informational Issues	65	20	17	16	25%
Design Entrepreneurship	91	65	44	34	37%
General	573	296	210	189	33%

53% of the 189 final selected contributions are from Europe and 47% outside of Europe. Here the top 5 countries:

- **21% China (39)**
- **19% Italy (36)**
- **12% France (22)**
- **10% United-States (19)**
- **5% United Kingdom (10)**

Track Chairs

Clémence Montagne	Care and Public Innovative Action Issues Track Chair
Sophie Eberhardt.	Regenerative City and Territorial Development Track Chair
Frédérique Krupa	Digital Ethics Track Chair
Julia Kunkel	Food Transition Track Chair
Karl Pineau	Informational Issues Track Chair
Joesph Press	Design Entrepreneurship Track Chair

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Emmanuel Mahé	École Nationale Supérieure des Arts Décoratifs (ENSAD)
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Caroline Naphegyi	École Camondo
Ioana Ocnarescu	Strate, Ecole de Design
Sébastien Proulx	Ohio State University
Susana Paixao-Barra-dos	Kedge Art School, Kedge Business School
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Katherine Sowley	École supérieure d'arts et de design de Reim

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Sonia Massari
Sophie Eberhardt
stephanie Hemon
Xiao Lu
Yang Yeqiu
Yuhao Jiang
Zhiyu ZHAO
Zoé Bonnardot

PROGRAM

4 days

553 participants

61 countries

400 schools

221 contributions

24 workshops & working groups

9 Speakers of honors

KEYNOTES

Cynthia Fleury

Professor of the « Humanities and Health » Chair at the Conservatoire National des Arts et Métiers, is also an associate professor at the École des Mines (PSL/ Mines-Paristech). Her research focuses on the tools of democratic regulation.

She is the author of several works, including Dialoguing with the East (PUF, 2003), The Pathologies of Democracy(Fayard, 2005; Paperback 2009), The End of Courage (Fayard, 2010; Paperback, 2011), The Irreplaceables (Gallimard, 2015), and Here Lies Bitterness (2020).

She has taught for a long time at the École Polytechnique and Sciences Po (Paris). She was the president of the NGO Europanova, which organized the Citizens' Convention for Europe (the largest gathering of European civil society). She currently serves as its vice-president. Upon joining the CCNE (National Consultative Ethics Committee) in 2013, she became its youngest member. She is also a founding member of the European Network of Women Philosophers of UNESCO. As a psychoanalyst, she is the patron of ICCARRE (the intermittent treatment protocol for HIV) and a member of the emergency medical-psychological unit of SAMU (CUMP-Necker).

After founding the Chair of Philosophy at the Hospital (Hôtel-Dieu Paris), she is now the holder of the Chair of Philosophy at the GHU Paris Psychiatry and Neurosciences. Cynthia Fleury was chosen to be the associated personality of Les Champs Libres in Rennes from 2018 to 2021.

Federico Casalegno

Federico Casalegno is Executive Vice President of Design at Samsung Electronics. He heads the Samsung Design Innovation Center (SDIC) in San Francisco, CA, Next-Generation Experience Planning Teams in Seoul across business units and head of Design and AI.

Federico leads global multidisciplinary teams in the USA, Asia, and Europe to design new generations of experiences and envision future products. As a designer, innovator, and social scientist, he focuses on the impact of networked digital technologies on human behavior and society, and designs products, services, and meaningful experiences to improve people's lives.

Before joining Samsung, Federico was an Associate Professor of Practice at the Massachusetts Institute of Technology, teaching at MIT and MIT Media Lab. He also founded and directed the MIT Design Lab and the MIT Mobile Experience Lab. He previously worked at Motorola, Inc. and Philips Design, envisioning and creating innovative product experiences. He has been awarded honorary professorships at the Glasgow School of Art, University of Glasgow, and the Jiangnan University

School of Design in Wuxi, China. He has published several scientific papers in peer-reviewed journals, along with books and articles, and he has won several awards for his design and innovation work.

Federico earned his PhD in Sociology of Culture and Communication from the Sorbonne University in Paris, France, with a focus on mediated communication and social interaction in networked communities and smart cities.

Gjoko Muratovski

Gjoko Muratovski is an award-winning designer, researcher and innovation consultant working with a wide range of universities, Fortune 500 companies, and various governments from around the world. By combining design-led innovation, social sciences, and strategic foresight with agile and lean management principles and evidence-based research, he helps organizations become human-centric, socially responsible, and future-proofed. Throughout his career he has held numerous leadership and high-profile appointments at various institutions. He was invited to join various thought-leading organizations such as the Forbes Councils, Stanford Institute for Innovation in Developing Economies, Oxford University Society, Oxford Digital Leaders Network, Yale Higher Education Leadership Summit, and the White House Presidential Innovation Fellows Program. Muratovski was elected as a Fellow of the Design Research Society (FDRS) for his contributions to the field of design research.

Fabien Grégoire

Born in Nantes in 1976, Fabien Grégoire is a French designer who has spent a significant part of his career in Japan. A graduate of l'École de Design Nantes Atlantique in 2001, he worked as a freelancer for companies such as Staub and Visteon before joining KENWOOD in 2002. During his time in Japan, Fabien distinguished himself in advanced design, pushing the boundaries of both hardware and software design in collaboration with various Japanese and international companies across high-tech, automotive, entertainment, professional solutions, and healthcare industries. He had an impressive career at JVCKENWOOD, rising from design director to a top executive role. After a brief stint in consulting, Fabien joined Saint-Gobain in 2024 as Head of Experience Design for HPS (High Performance Solutions) to shape new digital business opportunities.

Rohit Priyadarshi Sanatani

Rohit Priyadarshi Sanatani is a design researcher and a PhD fellow in Design Computation at the Leventhal Center for Advanced Urbanism (LCAU) at the Massachusetts Institute of Technology (MIT). Rohit's interests lie in empirical and data-driven lines of inquiry into the experiential qualities of urban environments – such as perceived beauty or safety. His recent work has focused on the creation of design assistance and evaluation tools that help designers and planners systematically engage with such complex and often subjective aspects of the public realm. His projects have been presented across multiple research platforms globally.

An architect and urban designer by training, Rohit holds a dual MS in Design Computation and in Computer Science from MIT. He has also worked with the MIT Senseable City Lab on projects involving large-scale urban visual analytics. Prior to MIT, he was associated as Assistant Professor at the Department of Urban Design, School of Planning and Architecture (SPA), New Delhi, and was involved in multiple masterplan development schemes across India.

Antoinette Lemens

Born in the Netherlands with an English father and a Norwegian mother, Antoinette Lemens pursued her studies in Belgium, Spain, and England. She began her career at a creative agency in London before joining Concept Group, a design agency in Paris. For four years, she worked for Kenzo, handling the brand's visual identity and communication on an international level. She became the General Director of the international group Novamark before founding her own company, Jobs in Creation, which specialized in recruiting creative talent. In 2004, she joined Aquent and became responsible for key accounts internationally. She left this firm in 2009 and founded her new company: Lemens & Partners, specializing in the recruitment of top creatives internationally in the fields of luxury, fashion, and design.

A keen observer of personalities and behaviors, she is also highly attuned to trends and locations. She organizes and leads Retail Tours for many brands. From Paris to Berlin, New York to London, she and her team discover the most original boutiques and concepts, unique décor, and exceptional experiences.

Antoinette Lemens is also deeply involved in the design industry and has held

the position of General Delegate of the "Association Design Conseil" for over 25 years. This association aims to promote design and its various disciplines to public authorities, professional associations, and advertisers. She is very involved in international juries for design competitions in fashion, luxury and in the industrial sector. She is also very invested in promoting young talent and works closely with design schools.

Sihem Jouini

Sihem BenMahmoud-Jouini, associate professor at HEC Paris and researcher at GREGHEC, specializes in the management of innovation, disruptive innovation and design in the transformation of organizations. She teaches project management, innovation and creativity, and directs several academic programs, including the MS X-HEC Entrepreneurs and Executive MBA majors. Her research focuses on the organization of exploration and new product development processes. She has published numerous articles and books on these subjects and is a regular speaker at international conferences. She works with companies and institutions such as Thales, Valeo, Air Liquide and Danone.

Matthieu Aquino

Matthieu Aquino is a co-founder of two global design organizations at Fortune 100 companies—3M and PepsiCo. Over the years, he has built performance-driven design functions that have significantly enhanced both organizations' innovation and growth. With expertise across all design disciplines – branding, packaging, product and interior design, digital experiences, and brand activations – Matthieu has led transformative initiatives in a variety of industries, including consumer electronics, hospitality, retail, architecture, art, fashion, and both professional and consumer goods. Currently, Matthieu serves as Vice President of Global Foods Design, Brand & Customer Experience at PepsiCo, where he oversees a $55 billion portfolio of brands. Originally from a small town near Versailles in France and deeply connected to his Italian heritage, Matthieu is a true global citizen. He has lived and worked in key markets across three continents and has established Design Centers in more than ten cities worldwide, enriching his leadership experience in building corporate capabilities. Matthieu has also served on multiple design award panels, was elected to the Advisory Board of the international design school IED and earned over 450 design awards with his teams at PepsiCo.

Stéphanie Roland

Stéphanie Roland is a Brussels-based visual artist and filmmaker. Hovering between documentary and imaginary, her films and installations explore the invisible structures of the Western world, the large scales of time, and hyperobjects. She draws her inspiration from a wide range of subjects, from environmentalism and politics to geology and the cosmos.

Having graduated from Brussels' La Cambre and studied with Hito Steyerl at the UDK Berlin, she completed a course in France at Le Fresnoy – Studio national des arts contemporains. Her projects regularly feature in exhibitions at internationally renowned institutions: Venice Biennale, Centre Pompidou, Louvre Museum, Benaki Museum, Haus der Kulturen der Welt, Botanique, Kampala International Art Biennale, Wiels, and ISELP. Breda Photo, Belfast Photo Festival,Encontros da Imagem, BIP Liège and MOPLA Los Angeles are some of the photography festivals in which she has participated.

Her films have been shown at international festivals such as Visions du Réel, FID Marseille, Festival dei Popoli, ZINEBI Bilbao, FEST New Directors / New Films, Rencontres Internationales Paris / Berlin,

Curtas Cinema and PÖFF Shorts Tallin black nights, to name but a few. Her first film,Podesta Island, won the Alice Guy prize at the FID Marseille while her second, Le cercle vide, won the TËNK prize at the Visions du Réel festival in Nyon.

The Cumulus PhD Network: Nurturing Emerging Voices in Design Research

The Cumulus PhD Network represents a distinctive initiative within our association, dedicated to supporting and empowering the next generation of design researchers. Established as a separate and dedicated platform, the PhD Network provides current doctoral students with a unique opportunity to present their ongoing thesis research and engage with the international design education community at a crucial stage of their academic journey.

Unlike traditional conference tracks, the Cumulus PhD Network operates as an independent call for papers, specifically designed for PhD students who have not yet completed their doctoral studies. This initiative embodies Cumulus's commitment to fostering emerging scholarship and creating meaningful spaces for intellectual growth and exchange. The format encourages doctoral researchers to submit their work as single authors, presenting their research topics independently and receiving valuable feedback from peers and established scholars within the global design

community.

The PhD Network track distinguishes itself through its inclusive and flexible approach. Rather than constraining submissions to specific themes or predetermined tracks, it welcomes research across the full spectrum of design disciplines and methodologies. This openness reflects the diversity and richness of contemporary design research, allowing emerging scholars to explore questions that range from theoretical investigations to practice-based inquiries, from pedagogical innovations to speculative futures, from sustainability challenges to technological transformations.

At the Cumulus Nantes Atlantique 2025 Conference, the PhD Network

once again demonstrated its vital role in nurturing academic excellence and building connections across generations of researchers. The presentations offered by doctoral students revealed the intellectual vitality and critical thinking that characterize emerging design scholarship. These contributions not only enriched the conference program but also provided glimpses into the future directions of design research, showcasing innovative methodologies, interdisciplinary approaches, and fresh perspectives on pressing contemporary issues.

The papers collected in this section represent the diverse research interests and rigorous inquiry of our doctoral community. They reflect the commitment of young scholars to addressing complex challenges through design thinking, and their determination to contribute meaningfully to the evolution of design knowledge and practice. By providing this dedicated platform, Cumulus continues to invest in the future of design education, ensuring that emerging voices are heard, supported, and integrated into our global conversation about the role of design in shaping better futures for our planet and all its inhabitants.

A total of 78 proposals were submitted for this track, of which 31 were selected.

Track chair: Lorenzo Imbesi, professor Sapienza University, Cumulus president

Cumulus PhD Network Chairs by Track

Social and Community Design: Teresa Franqueira, University of Aveiro, Satu Miettinen, University of Lapland,

New Design Frontiers: Roberto Iñiguez Flores, Tecnológico de Monterrey, Smart Tech, AI & Futures: Lorenzo Imbesi, Sapienza University of Rome Viktor Malakuczi, Sapienza University of Rome

Visuality, Culture & Heritage: Anne Pikkov, Estonian Academy of Arts, Durability & Sustainable Design: Monica Di Ruvo, Cape Peninsula University of Technology

Ethics, Identity & Inclusive Design: Miaosen Gong, Jiangnan University

Urban Systems & Regenerative Strategies: Nicola Morelli, Aalborg University.

Cumulus PhD Network Reviewers

Veronica Barnes, Cape Peninsula University of Technology
Luca D'Elia, Sapienza University of Rome,
Loredana Di Lucchio, Sapienza University of Rome,
Monica Di Ruvo, Cape Peninsula University of Technology
Yumei, Jiangnan University
Ana Margarida Ribeiro Dias Fernandes Gomes Ferreira, University of Beira Interior
Teresa Franqueira, University of Aveiro,
Angela Giambattista, Sapienza University of Rome
Miaosen Gong, Jiangnan University
Susana Gonzaga, University of Madeira
Gabriele Goretti, University of Pisa
Lorenzo Imbesi, Sapienza University of Rome
Massimo Imparato, Canadian University Dubai
Roberto Iniguez Flores, Tecnológico de Monterrey
June Jordaan, Cape Peninsula University of Technology
Natacha Lallemand, École Duperré
Lu Yichen, Jiangnan University
Blessing Makwambeni, Cape Peninsula University of Technology
Viktor Malakuczi, Sapienza University of Rome,
Sonia Massari, University of Pisa
Adelina Mbinjama, Cape Peninsula University of Technology
Enza Migliore, Southern University of Science and Technology
Nicola Morelli, Aalborg University
Amanda Morris, Cape Peninsula University of Technology
Alfredo Narvaez Lozano, Tecnológico de Monterrey
Susana Paixão, KEDGE Business School
Pei Xue, Politecnico di Milano
Alessandro Pollini, Uninettuno University,
David Sánchez Ruano, Tecnológico de Monterrey
Jorge Sanabria Zepeda, Tecnológico de Monterrey,
Bruce Snaddon, Cape Peninsula University of Technology
Álvaro Sousa, University of Aveiro
Belinda Verster, Cape Peninsula University of Technology
Mariia Zolotova, Xi'an Jiaotong-Liverpool University

Sciences du design 10th anniversary

To mark the tenth anniversary of Sciences du Design and the publication of its twentieth issue, the journal's Editors invited the world's French-language design research community to Nantes on June 3, 2025, for an exceptional symposium ahead of the Cumulus Spring 2025 Conference Ethical Leadership: A New Frontier for Design.

The aim was both to celebrate French-language design research, whose dynamism is evident in the 20 issues published by Sciences du Design, and to explore the new territories of design research and their potential for transforming our world in crisis.

On this occasion, the Sciences du Design editorial team welcomed the French philosopher Cynthia Fleury for the opening lecture as guest of honor.

An exceptional call for contributions has been launched. The entire French-language design research community worldwide was warmly encouraged to join us for this exceptional event, which represents a rare and unique opportunity to meet face-to-face.

Symposium Chairs

Stéphane Vial	Université du Québec à Montréal (Canada)
Marie-Julie Catoir-Brisson	Audencia SciencesCom (France)
Zoé Bonnardot	École Supérieure de Design de Troyes (France)

Scientific committee

Zoé Bonnardot	École Supérieure de Design de Troyes (France)
Marie-Julie Catoir-Brisson	Audencia SciencesCom (France)
Jocelyne Le Boeuf	L'École de design Nantes Atlantique (France)
Sébastien Proulx	École de technologie supérieure, ÉTS (Canada)
Stéphane Vial	Université du Québec à Montréal (Canada)

Cumulus Design Declaration

Reaffirming design's commitment to inclusivity, collaboration and planet-centred innovation amidst global challenges.

The present Cumulus Design Declaration has as its precedent the Kyoto Design Declaration of 2008, which was proposed to express the responsibility of design in an era marked by the challenges of sustainability and globalization. The Cumulus Association has been the platform for this, and over the years the values of the Declaration have been adopted by its members and partner institutions, such as international companies, governments and sister organizations. Given the pace of change and the contemporary challenges we face as a society, the association set out to revisit the Kyoto Design Declaration and reaffirm design's commitment to society and the planet. This has been done in an open and collaborative way by means of a two-year process involving surveys, workshops and discussion forums for the participation of associates representing 400 educational institutions and more than 40 institutional partners worldwide, all accompanied by semantic and data analysis to co-create an evolved version of the original Design Declaration.

From Human-Centered to Planet-Centered

We are in need of a paradigm shift from human-driven development to planet-centred design as the basis for an interdependent coexistence between humans and non-humans. The history of how we have

impacted our planet leads us through the current Anthropocene epoch, which significantly questions how we can design with meaning and consciousness. Every design action has an impact on the entire system of life we call Earth, our only home. As humans, we recognize symbiotic conditions with other living systems to promote healthy interactions and regenerative efforts. The position of a forward-looking collective society shapes a way in which lifecycles, patterns and the rhythm of nature resonate with our consumption, health and development.

Rethinking Sustainability

The Sustainable Development Goals (SDGs) have led to massive changes in policy and production with the aim of achieving a better future. These goals make it clear that the role of design is critical to creating a more inclusive, connected and resilient society. Universal access to resources, food, places and information requires a wide range of design strategies and tools, but also a paradigm shift towards a new contract with nature. Climate emergencies, economic fluctuations and natural disasters reveal challenges that require alliances across institutions, disciplines, civil society and governments together with the design community to promote regenerative cultures. Design can redefine itself and take on new roles, from creating responsible products, services and systems to leading creative action towards the necessary transitions.

Inclusiveness and Togetherness

Unity is about diversity, respect and openness to different cultures and traditions. Conviviality must be redesigned to promote social justice and to strengthen trust. Ongoing collaboration across borders, sectors, disciplines and cultures is needed to expand the value of design. Interconnected communities of designers in future societies will face the next challenges, such as mass migration, gender issues and inequality. Design needs a permanent agenda promoting empathy and care as drivers for peace.

Design in Plural

We are experiencing a global citizenship promoted by an interconnected economy, with constant cultural exchanges and information flows that

mainly go from dominant regions to the global south. Every region of the planet has its own uniqueness and values; decolonizing design needs to happen thus ensuring that innovation benefits localities. More than ever, we need to reconnect with diverse knowledge, from indigenous wisdom to science, to thrive as a multitude of species, and increase the impact of design in urban and rural environments, learning from every culture and tradition. A pluriversal approach is needed, represented by a deep responsibility to each community and the different ways of being in the world.

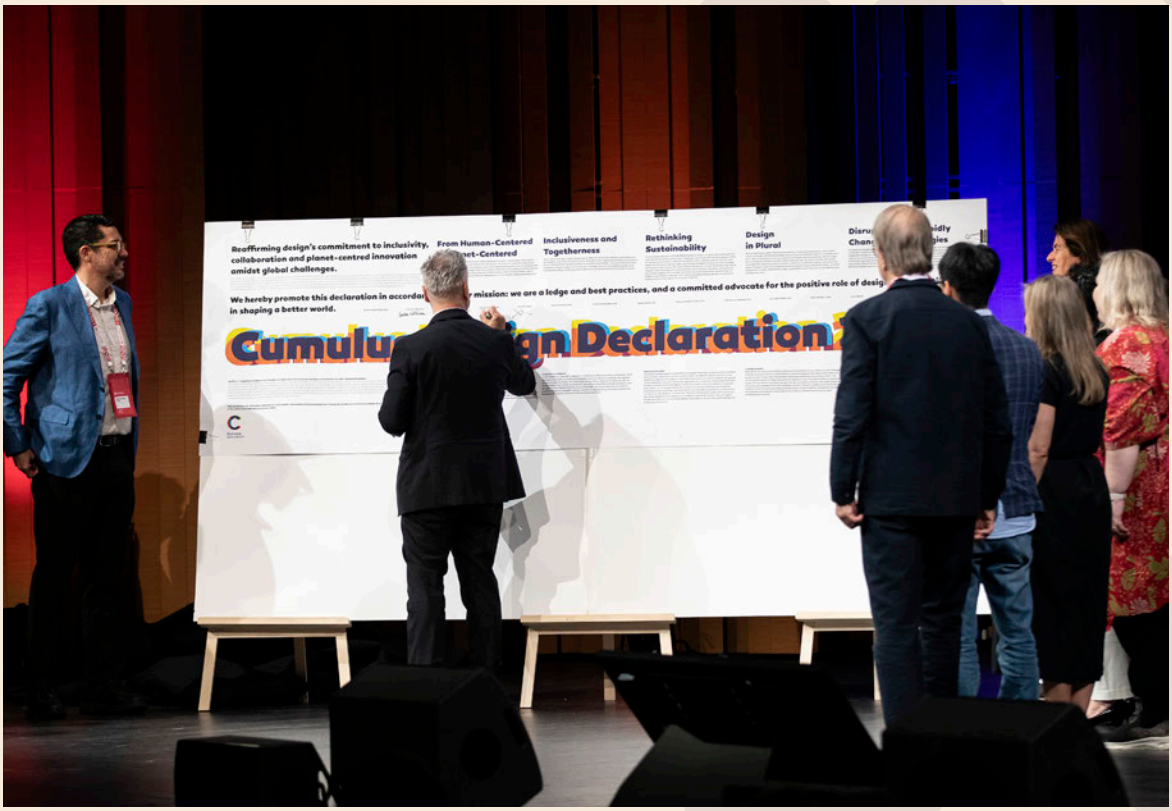
Disruption with Rapidly Changing Technologies

Emergent technologies are changing geopolitical and social conditions rapidly. More than ever, art and design universities, creative youth, designers and other professionals should offer their ability to understand and engage with change as a resource for our society. Artificial intelligence, synthetic biology and cognitive sciences are transforming our way of living and what we understand as humans. Information surveillance and related augmented technologies are post-human realities. Designers are well positioned to seize the opportunities offered for this disruption by envisioning possible futures and working in transdisciplinary teams that enable creativity in preferred directions and thus promote critical thinking as well as design action.

We hereby promote this declaration in accordance with our mission: we are a dynamic forum for the exchange of knowledge and best practices, and a committed advocate for the positive role of designers and artists in shaping a better world.

The Cumulus Declaration was signed and endorsed during the opening of the Ethical Leadership: A New Frontier for Design conference in Nantes, June 4.

Graphic design: Ruedi Baur


Reaffirming design's commitment to inclusivity, collaboration and planet-centred innovation amidst global challenges.
From Human-Centered
Inclusiveness and Togetherness
Rethinking Sustainability
Design in Plural

ethical leadership
a new frontier for design
L'ÉCOLE DE DESIGN
Cumulus Association

Cumulus Design Conversations

A French perspective on design, at the crossroad of global challenges and growth

The Cumulus Design Conversations between research, education, business representatives and design practitioners on June 5, 2025 highlighted design as a driving force for transformation: how to rethink education, skills, academic alliances, and industrial partnerships to prepare a new generation of committed designers? What attitudes, tools, and languages can make design a lever for collective resilience?

Three main axes had structured the discussions:

- Ethical leadership in design: how can designers become influential actors of change?
- Skills of tomorrow's designer: what critical, technical, and collaborative abilities are needed to act in complex contexts?
- The role of schools in the transition: how to transform curricula and pedagogical cultures to meet the challenges of the 21st century?

Chair: Florent ORSONI, L'École de design Nantes Atlantique

Keynote Speech: Gilles ROUGON, World Design Organization, APCI

These conversations took the form of roundtables featuring key French actors from academia, industry, and the design ecosystem. Two major topics were addressed:

1 – Climate Change and Resilience — The key role of ethical design leadership

Climate change demands a profound transformation of industrial and social practices, where resilience becomes essential in the face of growing geopolitical and environmental constraints. Can design play a pivotal role in developing sustainable, eco-responsible models adapted to an ever-evolving world? This panel explores how various industries collaborate with design to address these challenges, showcasing concrete and innovative solutions.

Speakers : Clara BOVE, User Research and Design Lead - AXA DC, Katie COTELLON, Head of Design and User Experience - Saint Gobain, Nicolas BUCHE, Business Innovation Manager - Orano, Emmanuel THOUAN, President of APC.

Fruitful Conversations #1

Keynote witnesses: Srini SRINIVASAN, COO Design Innovation Institute Shanghai (China) & Past president WDO, Joseph PRESS, Dean at NACAA (China)

2 – AI and the designer — Rethinking intelligence & creativity in the age of machines

Artificial Intelligence (AI) is transforming industries, professions, and our understanding of what it means to be human. For designers, this shift raises critical questions: How does AI challenge traditional practices and create new opportunities? What role does the designer play in maintaining human-centric values in an increasingly automated world? This panel explores the intersection of AI, design, and humanity, addressing the balance between innovation and ethics, and examining how design can lead in shaping responsible and sustainable futures.

Speakers: Jerome FERRARI FROMAGER, Design & User Xperience Director - Orange, Georgios – Alexandros TSALTAS, IP & Learning Specialist - European Union Intellectual Property Office, Anne ASENSIO, Vice president, Design Experience - Dassault Systèmes, Quentin LE PAPE, Founding Designer - ComandAI

Fruitful Conversations #2 : Design Education and Resilience

Keynote Witnesses: Christian GUELLERIN, General Director, L'École de design Nantes Atlantique (France), Yongqi LOU, Vice President, Tongji University, Fabienne MUNCH, Professor and Chair, Ohio State University (USA)

EPILOGUE : Design the French way !

From the Olympics to Notre-Dame — 2024 Icons : three highly renowned design contributions to emblematic events of 2024 in France

Mathieu LEHANNEUR, Designer of the Paris 2024 Olympic and Paralympic torch and cauldron, Ionna VAUTRIN, Designer of the Notre-Dame de Paris chair, Aurélien MEYER (Atelier Blam), Designer of Zeus, the mechanical horse from the Paris 2024 Olympic opening ceremony.

Session In partnership with APCI, French Association for Design Promotion

Chair: Stéphane GOURET, L'École de design Nantes Atlantique

Students Workshops

Two international student workshops took during the Cumulus week in Nantes.

The Carousel workshop to unit through design & storytelling

To celebrate the 15th anniversary of the Carousel network, our students in space design, product design and UX design collaborate with students from four other European design schools (Spain, Poland, Belgium, and Scotland) on the theme of storytelling. Together, they found, shared, and interpreted stories through objects, spaces, and digital interfaces. The stories they created aim to bring communities together around historical, cultural, personal, local, and international experiences, using the city of Nantes as a common thread.

Team:

Richard Firth, Edinburgh Napier University (Scotland)

Sofie Rumbaut and Katrijn Sabbe, Howest (Belgium)

Robert Plundra, Warsaw Academy of Fine Arts (Poland)

Paolo Susteric, Elisava, Barcelona (Spain)

Zélia Darnault, Xavier Drouaud, Florent Michel, L'École de design Nantes Atlantique (France)

With the participation of Bernard Stelandre (Ready to Shake, France)

Innovating with New Technologies

Students from the school and from NACAA, the French-Chinese design institute created in partnership with the China Academy of Art develop innovative concepts around themes such as artificial intelligence, brain-computer interfaces, healthcare robotics, AR/VR, and more. This workshop focused on designing projects that address real-world industrial challenges proposed by major Chinese tech and robotics companies (Alibaba, BrainCo, Rokid, etc.).

Team: Joseph Press, Jaimie Bautista, Anaïs Jacquard, Simon Lozac'h and Marine Belluet.

Type Directors Club Exhibition by ECV Nantes

Founded in 1946, the New York-based TDC (Type Directors Club) was created to promote the art of typography and the quality of typeface design. Its mission is to bring together graphic designers and typographers from around the world in order to support and uphold typographic excellence in both print and digital media.
For over 15 years, ECV Nantes has hosted the TDC's traveling exhibitions, which tour the globe with a single goal: to showcase the very best in contemporary graphic and typographic design.

Synthetic Memories Exhibition

Exhibition by the students of L'École de design Nantes Atlantique
Design in the Service of Memory in the Age of Generative AI
The Synthetic Memory exhibition explores how digital design and artificial intelligence are transforming our relationship to memory and history. Created by students from the Digital Design Lab at L'École de design Nantes Atlantique under the direction of artist Stéphanie Roland in partnership with Stéréolux, this exhibition is part of the InnovART III program by Campus France in Argentina and the international CUMULUS Nantes 2025 conference.

Design Cultures for Peace

A roundtable examining the important role of international design organizations in times of conflict. This session brings together design leaders to discuss how our global networks can respond ethically and effectively when faced with geopolitical tensions and humanitarian crises. The discussion will explore how design organizations can maintain open dialogue across divides, support affected communities, and advocate for peaceful solutions while respecting cultural sensitivities. Participants will share perspectives on balancing institutional neutrality with moral responsibility, and developing collaborative frameworks for design's contribution to peace-building efforts.

A timely conversation about the challenges and opportunities facing international design networks as they navigate complex global conflicts while upholding their educational and humanitarian missions.

FAISTOS Meetup

Co-organised by the City Design Lab at L'École de design Nantes Atlantique and the cluster FAISTOS, the meet-up aims to explore the fertile crossroads between research, innovation, artificial intelligence (AI) and design in order to rethink and to reshape how cities and regions are made. As ecological and social transitions and public expectations redefine our living spaces, the integration of emerging technologies, particularly AI, offers opportunities to imagine and model sustainable and inclusive environments.

Speakers :
Arpi Mangasaryan, Doctoral Student, École nationale supérieure d'architecture de Nantes
James Auger, Researcher, Director of the Design Department at ENS and Co-Director of the Centre for Research in Design (École normale supérieure Paris-Saclay)
Pascal Terracol, Professor, École nationale supérieur d'architecture Paris-Val de Seine, Head of architecture & Intelligence Chair
Vincent Dubois, Doctoral Student (CIFRE), Agence Qualité Construction / Université Paris Cité

Working groups

At each Cumulus conference, working groups gather around key design-related topics. These groups bring together people from diverse backgrounds — researchers, educators, professionals, and students — to share expertise, exchange practices, and embrace a plurality of approaches.

The following working groups convened during the conference:

- Design for Placemaking
- Women in Design
- Cirro
- Global X International Affairs
- Design Education for Social Change
- PRE AI Digital Culture
- Leadership & Strategy
- Food Think Tank
- Art and Design Teacher Education and Pedagogy
- Contemporary Art
- New Spaces / New Interiors
- Extraterrestrial
- Systemic Design in Design Education
- Design for Health, wellbeing and Aging
- Fashion& Textile
- Service Design
- Research Vectors in Design and Art
- Intellectual Property

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Chapter 1

CARE AND PUBLIC INNOVATIVE ACTION ISSUES

Managing new ethics of public design

Track Leader: Clémence Montagne, PhD

Care Design Lab director - L'École de design Nantes Atlantique

ethical leadership
a new frontier for design
JUNE 3-7, 2025
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Adapting Healthcare Design for Innovation: A Co-Design Approach to Transforming Facilities

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ABSTRACT | As the healthcare sector evolves rapidly, so too must the methods for capturing and integrating patients' experiences within drawing and development. To accommodate this dynamic environment, hospitals must be designed with flexibility for future expansions, developments, and to allow innovative practices in the near future, even not envisioned at the study phase. However, a paradox arises between the inherent uncertainty required for innovation and the structured professional practices of architects and engineers who design these facilities. This research explores how incorporating design methodologies and engaging designers in the planning and development stages of healthcare facilities can transform project outcomes. Through an in-depth case study of an architectural project, we demonstrate how implementing a co-design approach can drive meaningful project evolution. In this example, the co-design process involved a close collaboration between architects, engineers, and a medical team. This collaborative framework enabled the project team to re-evaluate and refine the entire patient journey, breaking down the different stages and touchpoints. By integrating design thinking and creative expertise into the facility design process, projects can adapt and evolve, impacting the program, spatial configurations, and user experiences. Such a co-design approach yields multifaceted benefits, including economic efficiency, improved management, technical advancements, and enhanced social impact.

KEYWORDS | Design / Healthcare facilities / Methodology / Organization

1. Introduction

On an international scale, hospitals are increasingly involving users, particularly patients, in decision-making processes to address challenges and related issues (Ahmed et al., 2014; Pomey et al., 2015). However, projects' transformation can often be restricted by the constraints of a built environment.

For example, since the early 2000s, French healthcare facilities, particularly emergency departments, have experienced a continuous rise in patient visits[1] and are facing challenges in accommodating the increasing patient flow, resulting in overcrowded services (Rapin & Garnier, 2022). To address this, existing structures must adopt greater agility in managing patient flows and adapt to evolving needs. Meanwhile, future building projects must proactively design pathways to ensure both efficiency and flexibility, addressing patient journeys and professional practices alike.

My doctoral research focuses on exploring ways to involve users in the design processes of healthcare facilities to develop solutions that are both relevant and innovative, while enabling adaptability in hospital services, practices, and technologies. I hypothesize that such an approach can drive the evolution of projects in their programming, spatial configurations, and usage, offering benefits across various dimensions: economic, managerial, technical, social...

2. Theoretical background

For nearly two decades, healthcare facilities have used patients' feedback collected through questionnaires to evaluate their services. For instance, surveys conducted by the British National Health Service (NHS)—including the Picker Institute Questionnaires and the National GP Patient Survey—highlight that service congestion often negatively affects the experiences of individuals (Ahmed et al., 2014). There is often a blurred distinction between "patient satisfaction" and "patient experience" (Ahmed et al., 2014; Anhang Price et al., 2014; Friedel, 2023). On the one hand, patient experience is frequently positively associated with other dimensions of healthcare quality (Ahmed et al., 2014). On the other hand, satisfaction has inherent limitations, as it reflects the gap between a respondent's expectations and their actual experience. As a result, a poor experience may still show relative satisfaction if initial expectations were quite low.

Moreover, a highly competitive context prevails : 2,976 hospitals and clinics[2] recorded at the close of 2022, in France. In their efforts to distinguish themselves, healthcare facilities frequently focus on assessing criteria such as safety and quality of care, with a focus on evaluating satisfaction and improving practices (Elliott et al., 2010). However, patient feedback collected through these channels can underscore concerns related to organization, pathfinding, space, or usage—factors that are not always adequately

[1] Direction de la recherche, des études, de l'évaluation et des statistiques. Enquête nationale sur les structures des urgences hospitalières, juin 2013.
Enquête nationale sur les structures des urgences hospitalières, juin 2013 | Direction de la recherche, des études, de l'évaluation et des statistiques.

[2] Direction de la recherche, des études, de l'évaluation et des statistiques (DREES). Enquête nationale sur les établissements de santé en 2022, 18 juillet 2024.
Les établissements de santé en 2022 - Édition 2024 | Direction de la recherche, des études, de l'évaluation et des statistiques.

addressed, often stem from various contextual factors (e.g., economic constraints, human resources, spatial considerations, etc.). The study and analysis of these elements would offer valuable insights for enriching and improving the quality of the patient experience, thereby contributing to the enhancement of the institution's reputation.

In this framework, certain institutions – or, more broadly, specific healthcare systems – focus on how to incorporate elements derived from patient feedback. On an international scale, particularly in Montreal, significant developments can be observed in approaches conducted to hospital and healthcare system transformations. These include the increasingly systematic incorporation of patients into decision-making processes and the establishment of a patient-partner status (Pomey et al., 2015; Karazivan et al., 2015). This dynamic, which seeks to enhance the status of the patients, presents an opportunity for them to actively participate in hospital transformations (Akrich & Rabeharisoa, 2012; Jobin, 2022), and is grounded in the recognition of patients' experiential knowledge (Jouet et al., 2010; Las Vergnas, 2011; Côté et al., 2017), which complements the academic expertise of healthcare practitioners.

While healthcare facilities appear to recognize the value of collaborating with multiple stakeholders, the integration of users remains to be adequately structured and supported in order to facilitate hospital transformations (Jobin, 2022).
Following the example of its growing application in innovation research, design and its participatory and collaborative methods are increasingly relevant in the healthcare sector (Cartoir-Brisson & Royer, 2017; Gravereaux, 2018; Delanoë-Vieux, 2023). It is observable that some hospitals are gradually integrating design and designers, with some even creating design-driven innovation research units within the hospital. Here are a few examples, though not exhaustive: Caroline Jobin at Brest's University Hospital, Loélia Rapin at Montpellier's University Hospital, and Nawel Gabsi-Bernard at Bordeaux's University Hospital.

Like many other organizations with varying scales and objectives, hospitals and the healthcare sector are constantly seeking innovation. However, innovation relies on an initial context that embraces uncertainty (Ben Mahmoud-Jouini et al., 2016) in order to provide a distinctive solution. But before proposing an answer, it is essential to accurately identify the problem at hand to ensure that a genuine need is being addressed, thereby avoiding "wicked problems" (Simon, 1973; Buchanan, 1992). One approach to innovation research is to adopt a methodology grounded in a concrete research context, as is common in the Humanities and Social Sciences or in design methods derived from these disciplines (Cartoir-Brisson & Royer, 2017). By recognizing the context and its stakeholders—users—as experts (Findeli, 2010 in Rapin & Garnier, 2022) who can and should shape the objectives and methods, design approaches offer collaborative frameworks, ranging from participatory to highly inclusive, to develop solutions that effectively address identified needs.

3. Research gap and objectives

Beyond user consultation initiatives, there is a contradiction between the dynamic driven by facility managers to transform and innovate within hospitals, and the current professional practices of those designing these buildings (Ben Mahmoud-Jouini et al., 2016; Le Roy et al., 2018). This leads to a second paradox: the uncertainty (1) required in

the context of innovation, and (2) inherent in consultation and co-design methods, such as those employed in design; versus the linear processes and methods of architects and engineers. In project management through design, with design being fundamentally a "discipline of project management" (Vial, 2021), the field and its stakeholders—whom the designer considers "experts in what they experience" (in Rapin and Garnier, 2022, Peyrard & Chamaret, 2025)—can guide the project according to their needs.

If hospital innovation units often focus on solving organizational or usage-related challenges, they are sometimes constrained by the built environment, limiting the modularity, flexibility, or adaptability of spaces and their functions. Could certain of these challenges be identified and addressed during the project's phases, before the buildings become operational (Fig.1)? This question forms the basis of an initial hypothesis, prompting an investigation into the design methods used for these facilities.

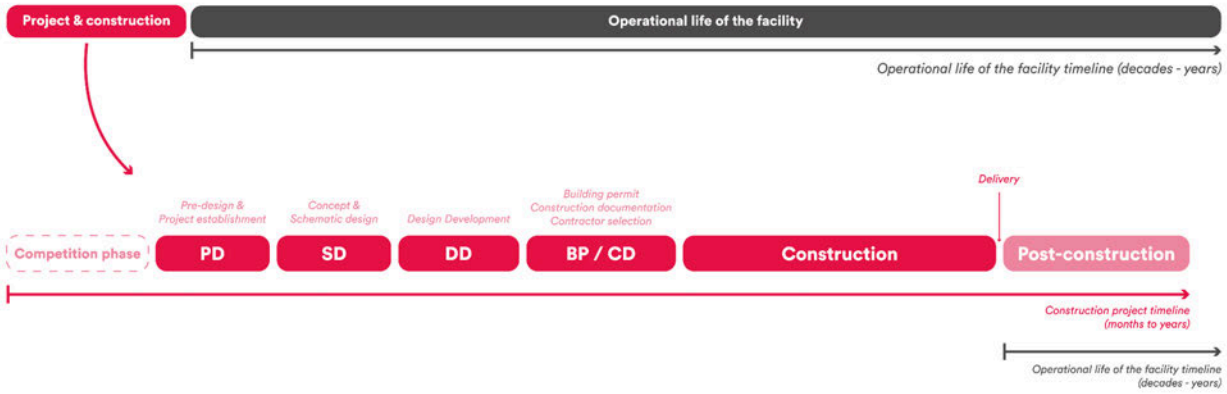

Figure 1. Schematic representation of a standard architectural project timeline. This diagram is based on the findings of brief interviews conducted with members of the AIA Life Designers firm, focusing on the project phases in which they are involved, and according to the main professional groups engaged.throughout the process.

As part of my doctoral research[3], I aim to investigate the discourse on support frameworks and the informational and communicational mechanisms required to implement an approach that integrates users within the design process of healthcare facilities. This study is grounded in methodologies and tools derived from design, as well as the Social Sciences, with the objective of contributing to the continuous improvement of the architectural quality, the functionality, and the usability of these buildings.

Through this doctoral research, and especially in this paper, the first objective is to demonstrate how integrating users into the design process not only transforms the architectural project but also enhances the solutions provided. In the example presented here, the architects utilized design tools and methods to foster a collaborative environment and co-design a solution.

[3] Manon Berthereaux is a designer and doctoral candidate specializing in the integration of design approaches in the healthcare sector. Currently pursuing a PhD in Information and Communication Sciences, she explores how healthcare facility designers adopt and incorporate design methodologies into their projects. As a designer-doctoral student, Manon Berthereaux's research tends to compare academic research with concrete experimentations in order to understand how far professional practices can develop such innovative and human-centered solutions, contributing to the creation of healthcare spaces that are more functional and adapted to user needs.

The second objective is to show that design is a structured, tool-based approach that enables both user consultation and integration into the design process, making it particularly relevant in the context of innovation and the improvement of both overall quality and functionality, notably in healthcare facility design (Bate & Robert, 2007).This paper provides an opportunity to focus on a practical case of managing an architectural project with a design-driven approach on the extension of the Yves Le Foll Hospital Centre in Saint-Brieuc, France.

Finally, the third objective is to analyse the existing info-communication dynamics within the organization, as well as those that could be integrated, to foster a user- and usage-centred project approach and to enrich current professional practices.

4. Methodology

4.1. Context

In response to a call for proposals to redesign the hospital in 2017, the AIA Life Designers firm[4] was selected for its proposed approach as the Design Authority, hereinafter referred to as the Project Management Team. Indeed, this team aimed to submit their architectural proposal to a panel of users, including a few end-users such as patients and their relatives. They also sought to present their sketches to that panel while also exploring and integrating ideas inspired by users' feedback.

To achieve this, the Project Management Team relied on co-design tools and methods derived from the design thinking approach (Rowe, 1991; Simon, 1996; Brown, 2008; Brown & Katz, 2009). A process involving successive phases of divergence and convergence, commonly referred to as the "double diamond" method from “design thinking” approach, was used here. More broadly, while efforts have been made to position design thinking as a tool to drive user-centred innovation, this approach is increasingly being scrutinized for its outcomes (Laursen & Haase, 2019; Bonnet, 2019), often reproducing problems rather than proposing solutions.

The design process was driven by a collaboration between the Project Management Team and the Hospital healthcare teams, referred to hereafter as the Client Authority. Grounded in the principles of co-design, this approach was implemented from the very beginning of the studies. The Project Management Team intended to design a project that was both human-centred and functional.

4.2. Approach

The approach employed here was structured in three phases: a first phase of discovery and exploration of the topic; a second phase of refining and focusing within a specific context; and a third phase of proposals, accompanied by iterative feedback and adjustments leading to the delivery of the project.

[4] AIA Life Designers is a French architecture and engineering firm whose main activity is designing healthcare facilities in France and abroad since 1965

Ten working groups were established, bringing together architects, engineers, healthcare professionals and management staff. The goal was to guide all groups in focusing on three key areas: the main lobby, the daycare hospital unit, and the ambulatory surgery unit.

The first two phases were carried out through several workshops.
Beginning with a broad theme, the first workshop encouraged participants to envision the Hospital's future in the medium term. They were invited to rethink the services, spaces, and uses. Nonetheless, one of the main objectives was also to create a specific moment for reflection and creativity, outside the professional frameworks of any of the stakeholders. The approach sought to move away from a professional perspective and return to a more human-centred one. After revising the design based on feedback from the first workshop, the Project Management Team organized a second creativity workshop centering the discussion on the specific case of the Yves Le Foll Hospital. Finally, all of these reflections were analysed and translated into spatial concepts, marking the third phase of the process.

4.3. Preliminary results

The Yves Le Foll Hospital extension produced the following preliminary outcomes, which should be further supplemented by a phase of evaluation that compares the intended objectives with the actual use of the spaces.

Figure 2.1. Plans of the Yves Le Foll Hospital Centre of Saint-Brieuc that were initially proposed during the competition phase. It shows only two systems were suggested to take care of patients in daycare hospital units of medicine and oncology. *© Manon Berthereaux from AIA Life Designers plans*

Figure 2.2. Plans of the Yves Le Foll Hospital Centre of Saint-Brieuc that were finally designed integrating expertises of both the Project Management Teams and the Hospital healthcare Team. Several systems to take care of patients in daycare hospital units of medicine and oncology can be seen, from the most intimate to the most open. *© Manon Berthereaux from AIA Life Designers plans*

First, the evolution of the design from the competition phase (Fig. 2.1.) to the final delivery is noticeable (Fig. 2.2.). The daycare hospital unit underwent the most significant changes, transitioning from the initial design proposed to the final design delivered. The final design reflects the values identified during the co-design workshops, which, as a reminder, aimed to develop a project that is both "human-centered and functional.". Furthermore, the project teams successfully fulfilled their advisory role by recommending a diverse range of patient care approaches, ranging from highly private (individual rooms) to more open settings (the "bubble" or the "alveolus") (Fig.3) . The designers were able to leverage their experiential expertise gained through years of practice in designing healthcare services and buildings (Bourdeloie & Douyère, 2014, in Kogan, 2016).

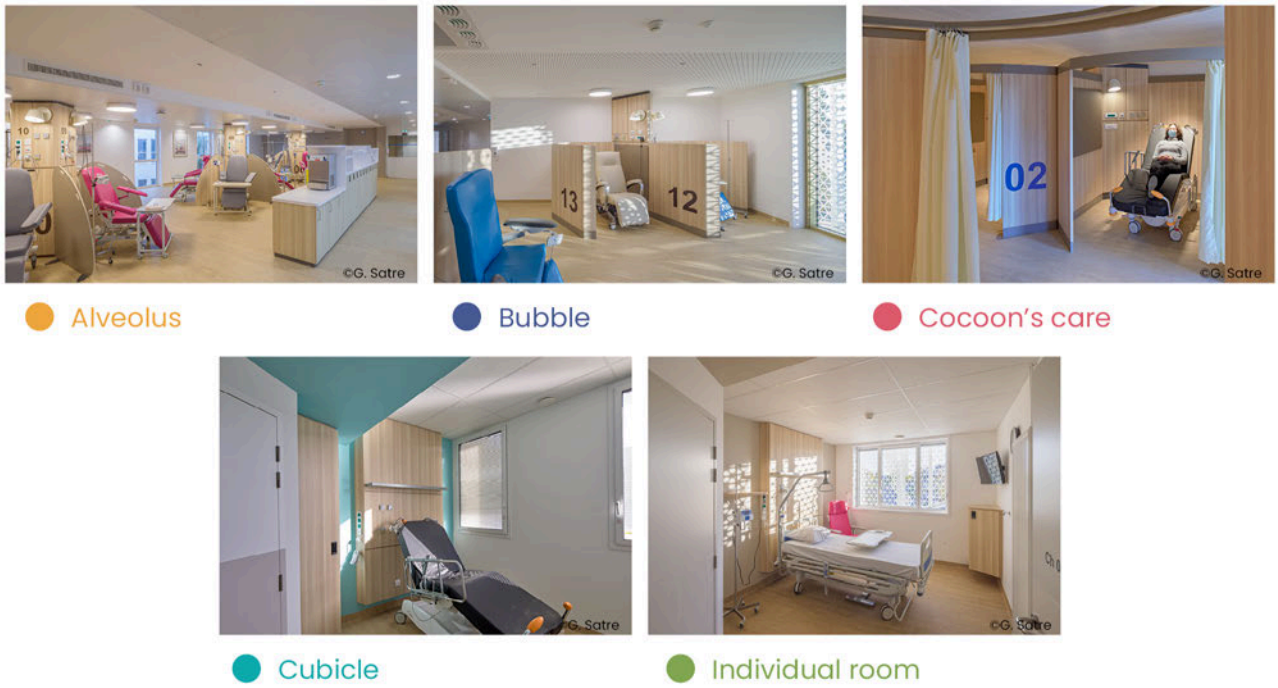

Figure 3. Various systems that were developed and built to take care of patients in daycare hospital units of medicine and oncology can be seen, from the most intimate to the most open. *© Guillaume Satre*

The inclusion of healthcare professionals in the project facilitated internal organizational transformations within the hospital. Collaborative work and discussions fostered dialogue among hospital staff regarding the impact of the extension on their daily work practices.

In the hospital environment, high staff turnover is a common challenge. Documenting the design process was crucial in promoting both acceptance and understanding of the project's objectives. This documentation served as a mediation tool between the teams participating and newly arrived staff. Furthermore, anchoring the project in the expectations expressed by the field contributed to support acceptance of certain transformations.

On the project management side, experimenting with a more collaborative approach helped stimulate the creativity of the teams, both in terms of aesthetic proposals and in finding solutions to usage-related issues. It also provided an opportunity to observe that implementing this approach does not necessarily result in significant cost overruns or delays in the project timeline.

5. Discussion

The first range of limitations is related to the various dynamics among stakeholders.

5.1. Stakeholders' dynamics within the user's panel

The first level of analysis focuses on the composition of the user panel engaged in the design process.

In the case of Saint-Brieuc Hospital, the panel was composed of various hospital staff members, including medical staff and department heads. While this composition allows for an exploration of quality of work life for these individuals, the representativeness of the group seems questionable. While healthcare professionals are included, it seems that one important group of users is missing from the table: the end-users such as patients and their relatives.

This contradicts the efforts made to recognize the patient as an expert, with experiential knowledge, and as an active participant in their own health journey (Akrich & Rabeharisoa, 2012; Pomey, 2015). The reasons behind the selection of users for the panel should be further explored, beyond the explanations provided so far, such as the difficulty in contacting patients.

While the design-driven approach encourages an examination of the dynamics and interactions among stakeholders within the project (Paquienséguy, 2019; Martin-Juchat & Bonnet, 2023), these dynamics seem to be biased in the context of the case discussed in this paper.

5.2. Stakeholders' dynamics within the hospital teams

Then, the relational dynamics between hospital stakeholders, as well as between them and the design teams, require investigation.

The approach adopted here relies on collaboration between the hospital teams and the design teams. This was made possible by (1) the design teams' willingness to adjust their project management process and (2) the Yves Le Foll Hospital's team who was receptive to the proposal and motivated to implement it. The success of this approach also depended on identifying key stakeholders who were convinced of the value and scope of this co-design work. The project contractors thus found a true ally and counterpart in the project owner team, which included a member of the hospital's medical staff.

From the hospital's perspective, the presence of a key stakeholder within the teams ensured effective project follow-up and helped minimize the sense of exclusion that hospital staff may feel in such situations (Gravereaux, 2018). It also supported the gradual transition of healthcare professionals toward organizational change.

However, we must question the effective implementation of a similar approach in a context where the project owner, and thus the client, does not actively support the initiative (Rapin & Garnier, 2022; Delanoë-Vieux, 2023; Schweitzer et al., 2023).

5.3. Stakeholders' dynamics within the conception firm

The last level of analysis focuses on the relationships between the actors within the design firm.

For the Saint-Brieuc project, the relational dynamics are shaped by a unique framework. In fact, the two collaborators who led the implementation of the approach have been working together for over twenty years. Both come from the same architectural background, with one having acted as a mentor and trainer to the other. They share a common vision of healthcare architecture, the pursuit of innovation, differentiation from competitors, and the importance of usage.

In addition, these two collaborators held key positions as project leaders in managing the project—one as the architecture project manager and the other as the interior architecture project manager. Due to their hierarchical roles, the project managers were able to promote their vision and enforce the implementation of the approach across the design teams, reflecting a top-down management (Gravereaux, 2018). This prompts the question of whether the adoption of a co-design methodology through design is only possible with the support and commitment of project managers who believe in its value and relevance.

5.4. Linear processes of conception teams

This brings us to examine the limitations of the current professional practices among healthcare facilities' designers.

Here, the design firm comprises a diverse range of professions covering the entire design spectrum. This structure enables the organization to maintain continuous oversight throughout all phases of the project, from initial concept to final delivery. Team members are staffed based on a predefined schedule and assigned tasks aligned with their specific expertise. While there is coordination and exchange between various disciplines, the overall organization remains characterized by a siloed structure. Although this does not necessarily impede innovation, a siloed approach can complicate communication and collaboration (Bento et al., 2020), which is also highlighted by some of the employees of the conception firm.

Additionally, there is a standardized sequencing of the stages in the process and project management, a practice rooted in the traditions of architecture and engineering (Ben Mahmoud et al., 2016). As previously mentioned, this approach conflicts with a fundamental aspect of innovation research: uncertainty. Can design then serve a dual role: (1) as a mediator and guarantor of transdisciplinary collaboration among design stakeholders (Gentès, 2017); and (2) as a catalyst for innovation in response to a injunction for creativity (Kogan & Andonova, 2019; Bonnet & Martin-Juchat, 2022)?

5.5. Designing “for”, “with” and “by”

Beyond linear processes, the current mindset of architects and engineers relies on a “designing for” dynamic. This involves projecting the perspective of a project stakeholders onto the usage and needs of users.

The approach implemented here introduced a more integrative dynamic by proposing to design "with" healthcare professionals. While this represents progress, a more inclusive collaboration with a representative panel of users could perhaps take the process a step further, especially by recognizing the expertise of patients (Bate & Robert, 2007, Akrich & Rabeharisoa, 2012 ; Paquienséguy, 2019). Despite some advancements, from the patients' perspective, project management still follows a "designing for" approach.

This raises the question of whether it would be possible to implement and systematize an inclusive co-design process that involves designing "with," "by," and "for" users in the context of healthcare facility design.

6. Conclusion

Based on the elements presented, incorporating a co-design method into the project design process has led to architectural proposals that better align with user needs and expectations. However, the representativeness of the user panel remains questionable, as patients were excluded from the decision-making process. Including patients could provide additional insights or even challenge perceptions of use held by other stakeholders.

From a methodological standpoint, this case demonstrated the feasibility of designing a healthcare facility by employing methods and tools derived from design practices. However, these theoretical approaches warrant scrutiny considering the limitations and critiques associated with design thinking and its outcomes.

Although the context presented here was favourable for implementing a collaborative approach, further research into the internal and external conditions influencing the deployment of similar methods within design firms could provide a more nuanced understanding and enrich the preliminary findings outlined earlier.

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About the Author:

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As a designer-doctoral student, Manon Berthereaux's research tends to compare academic research with concrete experimentations in order to understand how far professional practices can develop such innovative and human-centered solutions, contributing to the creation of healthcare spaces that are more functional and adapted to user needs.

ANCHORING IN TERRITORIES
for public design approaches

ADAPTATION - ACCESSIBILITY - CONNECTIONS - DURABILITY - EXCHANGES

INTRODUCTION

What if the territorial scope was an underestimated dimension in a good public design approach ?

6 design students asked themselves what Good Public Design was during a 5-days workshop in November 2024. They were specifically asked to explore this subject under the scope of the territory.

Following their analysis, territories are a portions of space outlined by stakeholders, of which limits evolve depending on the context. This context can be administrative (official frontiers), natural (defined by geographical elements like rivers), human-related (structured by socio-economics habits) or planned (related to a project's aim).

A territory's contour is often vague, evolving, and even biased, for it depends of local perception. There is no special method to define it : each project has to adjust its approach depending on its subject specificities and involved players.

Territory can be seen both **as an object of study or a material** for a given project.
So what is the role of a territory in a public design conception process ?
How does this territorial perspective redefines a public design approach ?

METHODOLOGY

In order to comprehend the impact of **territorial anchoring** in a public design approach, students went through several research steps.

UNDERSTANDING TERRITORIAL PUBLIC DESIGN
Formulation of hypotheses
- Public design definition
- Understanding territorial implementation : notions of scales, reproducibility...

→ research →

FIGURING OUT THE SIGNIFICANCE OF TERRITORIES
Reading, interviews
- Quick overview of public design literature
- First encounter with professionnals

→ analysis →

BRINGING TOGETHER DIFFERENT PERSPECTIVES
Good practices and difficulties
- Four 60-minuts interviews with public designers with experience with different scales (from town to state)

→ comparing →

CONCLUSION
Graphic synthesis
- Synthesis of good practices and difficulties
- Clustering steps of a territory oriented public design.

DESIGN TOOLS AS LEVERS TO ANCHORING A PUBLIC DESIGN PROJECT IN A TERRITORY

In order to be successful and adopted, a project must be anchored in a given context and must take care of cultural, social and economic specificities.

Project team has to develop a deep understanding of its territory (on administrative / geographical / human-related etc. levels), throughout the project. Design tools can be helpful as they allow to activate collective intelligence.

The route illustrated below sums up some big steps of good practices in order to root an innovation in the territory it is supposed to address :

First, it is important to understand how competences are split between local authorities. For instance in France, different administration layers will deal with very different jurisdictions :

Town	Metropole	County	Region	State
• Primary schools • Social centers • Local mission • Waste management	• Economical, social & cultural development and spatial planning • Urban design, habitat planning...	• Secondary schools • Road maintenance • Health & disability • Social integration, business promotion	• High schools • Higher education & research • Employment, training and learning • Rural affairs • European policies	• Social politics • Education staff • Public health • Solidarity organization • Pilotage of national agencies : environment, employment, retirement...

1 TARGETTING THE PROJECT

Re-examining the project order is essential to the pertinence of the result.

Then it is important to define for the first time the territorial limits of the project.

Always think about checking other territories, all through the project (7)

"Designing for territories requires a great affinity for human and social context and for users profile" Olivier Irrmann (4)

"Coming back to field studies makes you discover or remember whole parts of misunderstood life of citizens, or misunterstood work from your own colleagues" Olivier Irrmann (4)

2 KNOWING YOUR TERRITORY

Take an appropriate time to watch the territory and make a state of the art of your topic

Find the end-users and professional users evolving around your topic.

"While territories are different, sometimes problems remains the same" Sabine Zadrozynski, service designer

RECOMMENCER AVEC LE TERRITOIRE DE DEPLOIEMENT

3 UNDERSTANDING THE TERRITORY

Meet and absorb

Trusting and involving territory stakeholders will give access to their knowledge, and will make designers accept not to control everything, and share empowering tools instead (9)

Some tools to understand better a territory's organization : system or sensory map, immersion, field research, residence...

4 DESIGNING WITH PEOPLE

Anchor a project by taking into account the involved realities, thanks to collective intelligence tools, by focusing on lived experiences.

Co-creation formats : Creative sprints, workshops...

ITÉRATION

Being a designer also means connecting initiatives, understanding other existing ideas and being capable to transfer. That's why it is crucial to document a method so others can be inspired from it.

"Design puts back local in public action" Olivier Irrmann (4)

5 IN-SITU TESTS

Check and challenge the first solutions

Tools to experiment in the territory : prototypes, provotypes, quick-and-dirty models...

"Territories will always feed your processes" Sabine Zadrozynski, service designer

6 SETTING UP THE PROJECT

Finish up the installation
Document the approach

7 DEPLOYMENT

Consider the project's scalability, or its adaptability on other territories

EVALUATE

Evaluate the impact of the project on its territory

"A good design is a design that empowers people and considers the system and networks it becomes a part of" Sabine Zadrozynski, service designer

TIPS AND VIGILANCE

Here are the biggest steps in a project, based on the students' reading and interviews.
In this part you will find both key-points and points of vigilance for anchoring a project in its territory.

1 TARGETTING THE PROJECT

If the initial contract covers a important territory (a whole state, or a significant region) :
→ **Find a smaller territoty scale** in order to get closer to your users, and to identify with them the problematics that will end up being common to other territories.

Avoid duplicatas : several similar approaches are sometimes led in parallel in two different territories :
→ **Create links with other actors** so visions and knowledges can be crossed, and projects can fertilize each other instead of being unwillingly reproduced.

"We need territories to help focusing on the real problems" Sabine Zadrozynski, designer

2 KNOWING YOUR TERRITORY

Because of the plurality of actors, identifying stakeholders and finding the right contacts might me time-consuming :
→ **Understanding the background and the specificities in the territory** thanks to desk research will develop your comprehension of issues and influences

If the designer is rooted in a territory, attention must be paid to biases
→ **Always renew knowledges and confront points of view**

"Consider institutional cultures to adopt the appropriate attitude in the project : this can be done by analyzing literature search" Joachim Savin, designer

3 UNDERSTANDING THE TERRITORY

It may be difficult for a project team to make itself understood, and to establish a trust framework :
→ Identify and **verbalize the common goals shared by design teams and territorial actors**.

It is important to not get too biased by interviews of local actors :
→ **Cross different perspectives** (professional and end users, technical staff and management staff) **and sources** (interviews, observation, literature research...)

Integrating this multiplicity of actors representing a whole system takes time :
→ **Organize and plan** meetings and immersions, to get all the useful information in time.

4 DESIGNING WITH PEOPLE

Specificities of the users and stakeholders of a project must be taken into account when designers create their collaboration tools :
→ **Adapt design methods and tools to the specificities of people and places**

Budget might represent a difficulty for some administrations :
→ **DIY prototyping with modest materials** mustn't necessarily be avoided. A simple prototype will only lead the project team to anticipating deployment and adaptation.

"Finding a hyprid terrotory for the project is essential for the coherency of its installation. The geographical zone, the economy, users and their stories must be taken into account." Marie-Anaïs Bluteau-Borg, designer

5 IN-SITU TESTS

Project viability will be guaranteed by :
→ Implication of users and stakeholders in a test phase
→ Testing the project on different territories (if the project is to be developed on a different scale).
→ Keep close to the initial shared initial stakes.

6 SETTING UP THE PROJECT

Identify key actors who will carry the project and its solutions once the designers are finished :
→ Rely on the **actors networks** built during the previous project steps (Understanding and Designing)
→ Design team might remain a resource for sensibilisation and formation, as design understanding will facilitate transversality and identification of common languages.

Be prepared to gaps between en idealized project and its realization : when taken up by new actors, most of the times a project will be transformed several times :
→ **Protect the project** with documentation to not lose the initial purpose
→ **Lean on actors networks, communicate with them intensely and through multiple channels**
→ **Capitalize on your project** so other territories / actors can inspire and benefit from it

"Not a single local project can avoid a network implemantation, now seen not as an addendum, but as a core focus of the project." La 27ème Région (3)

7 DEPLOYMENT

Differences will be observed between territories, especially in the language used, and on a more global cultural level :
→ **Accept modifications and agree on concessions** to test and adapt a project to different territories

Rethink project governance if needed : you must keep a balance between an efficient management on this new scale, while maintaining a true local connexion :
→ **Identify the relevant project leader on the new territories :** they will need to manage a complex division of tasks and to cast specific skills to make the project take root.

"A design project creates an environment where communication and sharing becomes a common basis again, and where collaboration betwen peers replaces, at least for a given time, hierarchy-based coordination. Olivier Irrmann (4)

CONCLUSION

This research shows the importance of **territorial anchoring preparation**. This anticipation will imply a careful analysis of dynamics at work in the territory (financial stakes, cultural specificities, relationship between actors), so the territory can be described beyond its geographical dimension. Then, in addition to constituting the context of a project, **territory might be seen both as the object of the transformation of a project, and an infinite source material for the designer's work**.

Beyond a solid desk research gathering both quantitative and qualitative data, field immersion will give a project team a good momentum for territorial anchoring. It represents the opportunity to **identify the persons who can be mobilized, and to meet future projects users**. Collaborating with field actors is indeed crucial for the project to be relevant to the complex reality of a given territory. More specifically, local actors will allow the project to root in its context and to last in time, but actors from different territories will make the project more likely to be deployed - allowing it to be also more robust.
This inclusion of a wide variety of profiles will be eased by **the use of visual tools and adapted collaborative working environment** - putting design operational skills in the heart of the project process.

Several difficulties seem to remain relatively common though :
- Identifying key stakeholders might take time, as the ability for an actor to carry a project is difficult to anticipate.
- Lack of funding will often be highlighted as a drag on innovation and will commonly ask project teams to invent sober methods and to develop humble solutions.
- It is a delicate choice to find an appropriate territory, likely to gather all the key features (active networks, appropriate scale of intervention, representative users)

By taking time to understand existing initiatives, and by widening shared perspectives, **it becomes possible to conceive and adopt new solutions, rooted and robust, improving the habitability of a territory.**

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Interviews :
(7) Marie-Anaïs Bluteau-Borg, designer
(8) Joachim Savin, designer
(9) Sabine Zadrozynski, designer
(10) Léa Jouan, designer

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AMPLIFYING SOCIAL INITIATIVES OF THE THIRD SECTOR IN THE VENETIAN LANDSCAPE

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ABSTRACT | This paper explores how social innovation design practices can strengthen Third Sector initiatives, contributing to a more sustainable and equitable society. Through small-scale actions, Third Sector entities form a vast, often unmapped network that actively shapes a sector inclined toward social innovation. In the current context, many organizations leverage digital technology to advance social innovation. However, this process thrives as a participatory and context-sensitive approach rather than a universal model imposed from above. Two main perspectives typically drive this process: a critical stance on risks to individual freedoms and civic rights, and a 'techno-optimist' view that prioritizes technology despite potential impacts. Social enterprises face challenges due to limited resources, funding, or expertise. The iterative nature of design — marked by ongoing problem reassessment and solution synthesis — is particularly suited for experimentation in this field. The 'Amplify Social Initiatives' project, developed by an interdisciplinary research group, represents a social innovation initiative within the third sector. It aligns with a participatory approach by supporting internal solutions for partner organizations while documenting the methodology and results for broader dissemination. The project explores how the combination of social innovation and service design can foster relationships of care, initiate regenerative practices, and contribute to a fair and sustainable society. Tools such as brainstorming, prototyping, and storytelling play a crucial role in generating, testing, and communicating organizational values and visions. Aiming to develop a web ecosystem model, the project supports Third Sector organizations in enhancing their user-centered services by incorporating the latest UX/UI and human-centered design practices. It respects each social enterprise's identity while

ensuring consistent information organization and usability. The research framework integrates design methodologies with analytical models to reconstruct Third Sector processes, evaluating their impact in terms of reliability, efficiency, and alignment. This approach not only provides insights for strategic improvements but also guides communication strategies for initiatives that embody social innovation. This paper presents initial findings from action research conducted with partner organizations and discusses the development of the 'Amplify Social Initiatives' digital ecosystem extension. It also outlines the theoretical framework guiding the project. 'Amplify Social Initiatives' responds by providing a design-driven framework that fosters collaboration, adaptive digital culture, and social innovation. Communication is central to social innovation, not just as information exchange but as a generator of social bonds. By integrating design and technology, 'Amplify Social Initiatives' acts as a catalyst for collective intelligence, reinforcing community-driven initiatives and enhancing their scalability and impact.

KEYWORDS | THIRDSECTOR, SOCIAL-INNOVATION, DESIGN4TRANSITION, DIGITALPLATFORM

1. Introduction

As technology increasingly shapes our *social fabric*, Third Sector organizations face a pivotal challenge: how to harness digital innovation while preserving their fundamental mission of social impact. These organizations, which have traditionally excelled at addressing community needs through direct human interaction (Codice del Terzo Settore, 2017), now find themselves at a critical crossroads. While the digital revolution offers unprecedented opportunities for expanding their reach and effectiveness, many Third Sector entities struggle to bridge the gap between their social mission and technological advancement. Over sixty percent of Third Sector organizations in Italy acknowledge their incomplete digital transition (Italia Nonprofit, 2024). Balancing human connections with digital transition is not just a technical challenge but requires rethinking how social initiatives can thrive in a digital landscape (Cavotta, Grassi & Toschi, 2022).

The number of Third Sector and social private entities particularly in Italy remains substantial, representing socio-economic actors that, by mandate, pursue objectives beyond mere economic profit. These entities increasingly require new professional roles to support social innovation processes, as driven by their statutory mandate and societal function (Campagnaro & Bosso, 2023). Cooperatives, foundations, associations, and citizen groups increasingly acknowledge the critical role of design-thinking methodologies and competencies, particularly in facilitating technology and knowledge transfer and in the development of services within the domains of socio-cultural innovation in which they operate. What emerges is a compelling need for a new design framework as an integral part of social innovation — one that can enhance rather than diminish the human-centered nature of Third Sector work (Seravalli, Upadhyaya & Ernits, 2022).

This essay argues that successful digital transition in the Third Sector requires a co-designed approach that treats social initiatives as the primary drivers of both digital and social innovation. By reconceptualizing Third Sector organizations as *social antennas* capable of weaving social fabric (Bassi, 2013), 'Amplify Social Initiatives' is proposed as a theoretical and practical framework for the social-digital transition, as it integrates the design thinking method (IDEO, 2012) in the context of the Third Sector to amplify its social impact. This perspective not only preserves the sector's essential role in addressing societal needs but also leverages technology to amplify its impact in ways that

strengthen rather than substitute human connections (Binotto, 2010).

2.Objectives and methodology

The process of digital transition usually involves a complex social apparatus comprising three main actors, commonly referred to as the helixes of social innovation: companies, institutions, and research. These actors are typically engaged in social innovation processes. The so-called *fourth helix* model consists of an organized civil society, primarily composed of associations, committees, collectives, and groups of citizens with an interest in the initiatives presented.

The long tradition that sees codesign as a creator of contexts, tools, and procedures through which these different actors can better deliberate and learn from each other (Botero, 2013) makes it a privileged actor to proceed with a transition that brings together the methods, goals, and perspectives of the real *initiatives' makers*. Our approach combines *design thinking method* (IDEO, 2012) and *action research method* – the most appropriate methodology for any design project where the outcome is undefined, as noted by Swann (2002). As previously highlighted, the digitization processes of the Third Sector start with defining a problem whose solution is often far from being predetermined. Due to this characteristic, we have adopted an *anti-solutionist* approach that aims to iteratively frame and reframe the problem. The toolkit and the prototype of the digital ecosystem we propose are intended as *seeds of design* (Botero, 2013): their purpose extends beyond mere implementation and becomes a communicative act to reframe the challenge — understanding the real needs of the social sector for a technology that truly serves its social purpose.

The article describes the theoretical assumptions and the result of the design process that led us to break the linearity of the systematic process of *action-research* making visible the *iterative nature* of design processes (Swann, 2002) by placing *co-experience* at the center of action-research. The objectives of the research are thus to be understood in the dual nature typical of action research: practical problem-framing and co-learning of practices, addressing a specific problem through reflective processes. Findings suggest that design for social innovation in the third sector promotes redundancy and reflexivity (Light & Seravalli, 2019), using collaborative prototypes as useful supports for shared discussion and alignment rather than solving practical problems within organizations.

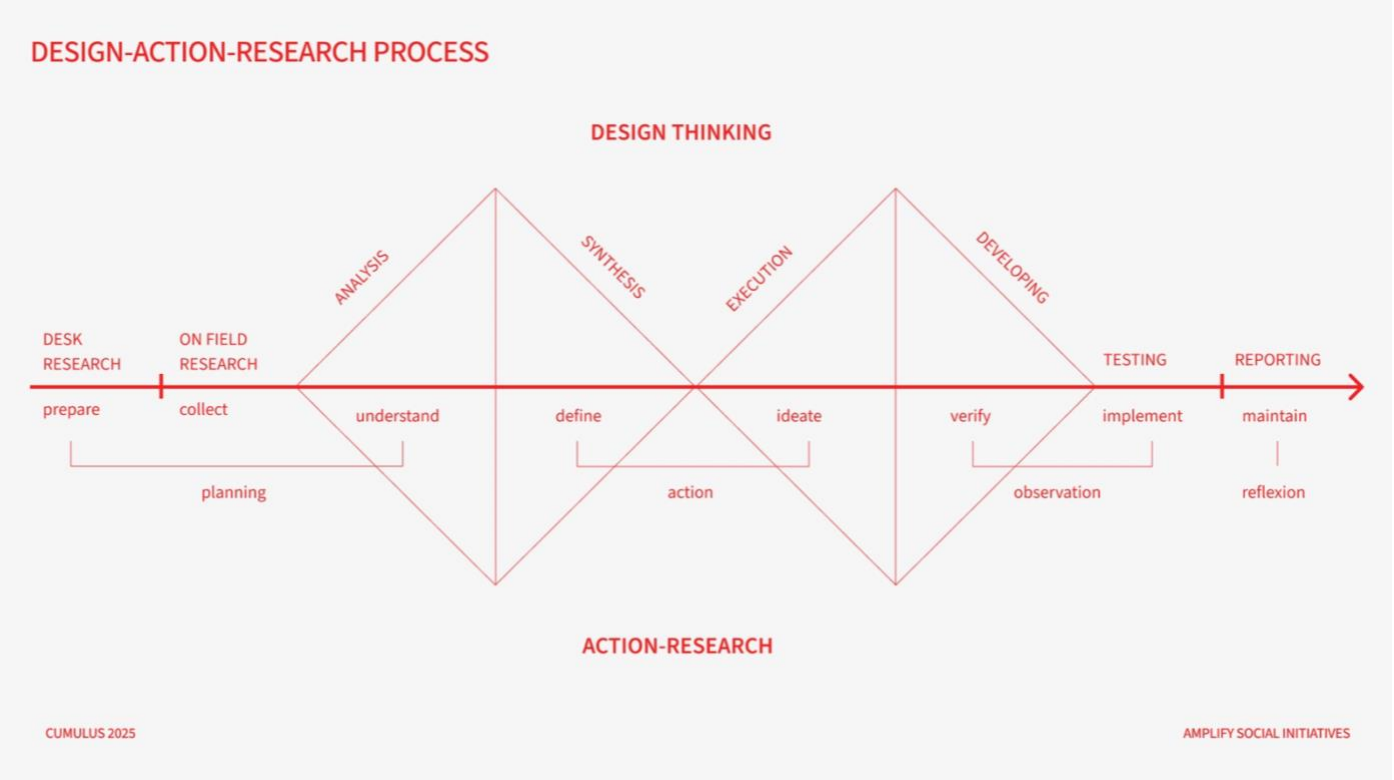

Figure 1. Methodological process diagram reviewed by Design Thinking Method (IDEO, 2012) and The Action Research Method (1993)

3.State of the art: desk research

3.1 Social innovation as the outcome of a design process

Design for social innovation manifests itself as an area of the design discipline concerned with the innovation of what affects *social structures* (Manzini 2014) and that necessarily — and increasingly in recent years — its research domain intertwined with social sciences. Moreover, design occurs when there is a joint invention of a solution to a collective and/or social problem (Zinna, 2020) and when the designer can contribute to rethinking the concrete critical spaces, services and their uses. However, when talking about change in the public sector we should consider it as the interplay between institutional aspects, societal challenges, and individuals' views and actions. So, designing with Third Sector organizations is not only useful in developing concrete outputs but is also and above all an opportunity for *reflexivity* and *rethinking* for the organization itself (Seravalli, Upadhyaya & Ernits, 2022).

Moreover, social innovation is a process in which there is no predetermined relationship between partnership patterns - roles, positions and functions of actors - and outcomes of the initiative in terms of *collaborative dynamics* (Granovetter, 1974). Therefore, in the present research, social innovation is the result of a highly contextual process - and never a *recipe dropped from above*, but rather an *autopoietic* process in which the outputs feed the inputs, in a circuit of social automation, as our framework proposes.
Technology, and particularly the use of digital tools as a vehicle for change, should be considered as a vector of desirable social innovation. It is a well-established belief that design and arts are a crucial way of applying technology and making it socially accepted for their humanistic and social approach to technology: giving meaning and making

things familiar. The social and *convivial approach* (Milani, 2022) to technology - and to transition - was one of the guiding principles we approached our project stakeholders.

3.2 Which digital technologies for which social innovation

Recently, Italy's Third Sector has increasingly engaged in projects that leverage technology to create social added value (Busacca, 2019).
According to a socio-technical paradigm, technologies are the combinations of information, computation, communication and connectivity technologies used to create, use, transmit or deliver electronic data. Technology management enables better decision-making through social collaboration, optimized resource allocation, and information sharing that attracts new potential stakeholders (Cavotta, Grassi & Toschi, 2022).
From a humanistic perspective, technologies evolve similarly to living organism: *adaptation* from function to organ and *exaptation* from organ to function (Milani, 2022). In this sense, digital technologies cannot be thought of as *pills to be assumed*. Equally indispensable is sociology and its qualitative method, because of its ability to grid different parameters, to give them weight and importance, and to draw from these comparisons assessments and predictions about certain social dimensions.

Specifically, this article refers to the branch of design that looks at digital technology to trigger, accelerate - and sometimes curb - certain ongoing social processes. The state of digital technology in Third Sector organizations is reported by Italia Nonprofit (2024), involving 665 organizations divided into the three most prevalent types (associations, social cooperatives and foundations). The report shows that a critical barrier to systematic innovation is the scarcity of resources and time which forces organizations to focus predominantly on present challenges, limiting their capacity for long-term planning and strategic innovation. It emerges that more than six out of ten organizations recognize that they are not yet fully digitalized (66.2%) but are aware that they are on a path of growth and improvement (52.7 percent). The report distinguishes between (1) digital management technologies - thus aimed at internal use - and (2) digital communication technologies - aimed at external audiences. Insights regarding the second category highlight the high use of the newsletter, through which the information conveyed mainly concerns updates on projects and initiatives (92.7%).

The proposed solutions therefore face up to these types of barriers to adoption in the current state of the art, with particular attention to the aspects of digital communication.

3.3 Co-designing for digital transition

Design, as mentioned earlier, can play an *intermediary role* in supporting and orienting these transition processes. The artifacts produced serve as *seeds of design* (Botero, 2013) in contexts characterized by high complexity and limited familiarity with creative processes. Codesign emerges as a crucial methodology for organizational development. *Prototype-based approaches* become extremely useful devices in verifying whether projects adequately address user needs and contextual requirements. This approach is particularly valuable in the digital transition process, where organizations must *navigate unfamiliar technological territories* while maintaining their social mission Campagnaro (2022). The successful implementation of co-design in the digital transition therefore requires an understanding of communication not only as a technical capability, but also as an *expression of phenomena* of diffused or organized relationality (Binotto, 2010). This perspective allows organizations to maintain their social base while embracing

technological innovation as a connector of intelligence and communities. Successful social innovation fundamentally relies on surfacing and transmitting knowledge embedded within individual experiences (Jedlowski & Leccardi, 2003). As Jedlowski (2003, p. 65) observes, the knowledge deposited in subjects' experiences is the source of innovation. While digital platforms facilitate community building and stakeholder engagement, this article reveals that successful digital transition demands more than fixed solutions: requiring an integrated, *evolving pathway* that emphasizes co-design processes.

4. Context analysis: on-field research

4.1 A technological matrix for social innovation needs

From the insights of early desk research, it emerged as the primary horizon of the project to identify a meeting point between the innovation needs of Third Sector entities and technological potential. The project partner enterprises were chosen for some common structural characteristics that allowed us to move in the Venetian ecosystem and for other differences that could give us a varied cross-section of the different possible responses to the same project intervention:

- Corte del Forner, small-sized volunteering association for food assistance;
- Sumo Cooperativa Sociale, medium-sized social enterprise for employment inclusion;
- Comunità di Venezia, big-sized cooperative for therapeutic care.

Not only does each social reality need to be analyzed individually to understand its characteristics and the nature of the service it offers, but technologies also need to be analyzed and synthesized to fully understand their benefits, limitations, risks, impacts, and prospects for the Third Sector (Cavotta, Grassi & Toschi, 2022). Technologies can be clustered according to their *vocation* between social impact-oriented technologies such as amplify project communication, communicate initiatives, do fundraising; and efficiency-oriented technologies - material storage, transparency of the institution, coordination of operators. The aim of clustering is to provide an analytical framework for understanding this relationship, with a *technological matrix for social innovation needs* (Figure 2) in the Third Sector, crossing on the x-axis the parameter *economic efficiency* and on the y-axis the parameter *social impact*. On this matrix we placed some of the technological tools surveyed and others usually used as levers of the digital transition. The construction of the matrix, together with the macro-structural analysis provided by Italia Non-Profit, was essential for us to be able to guide the interviews during the qualitative field survey phase.

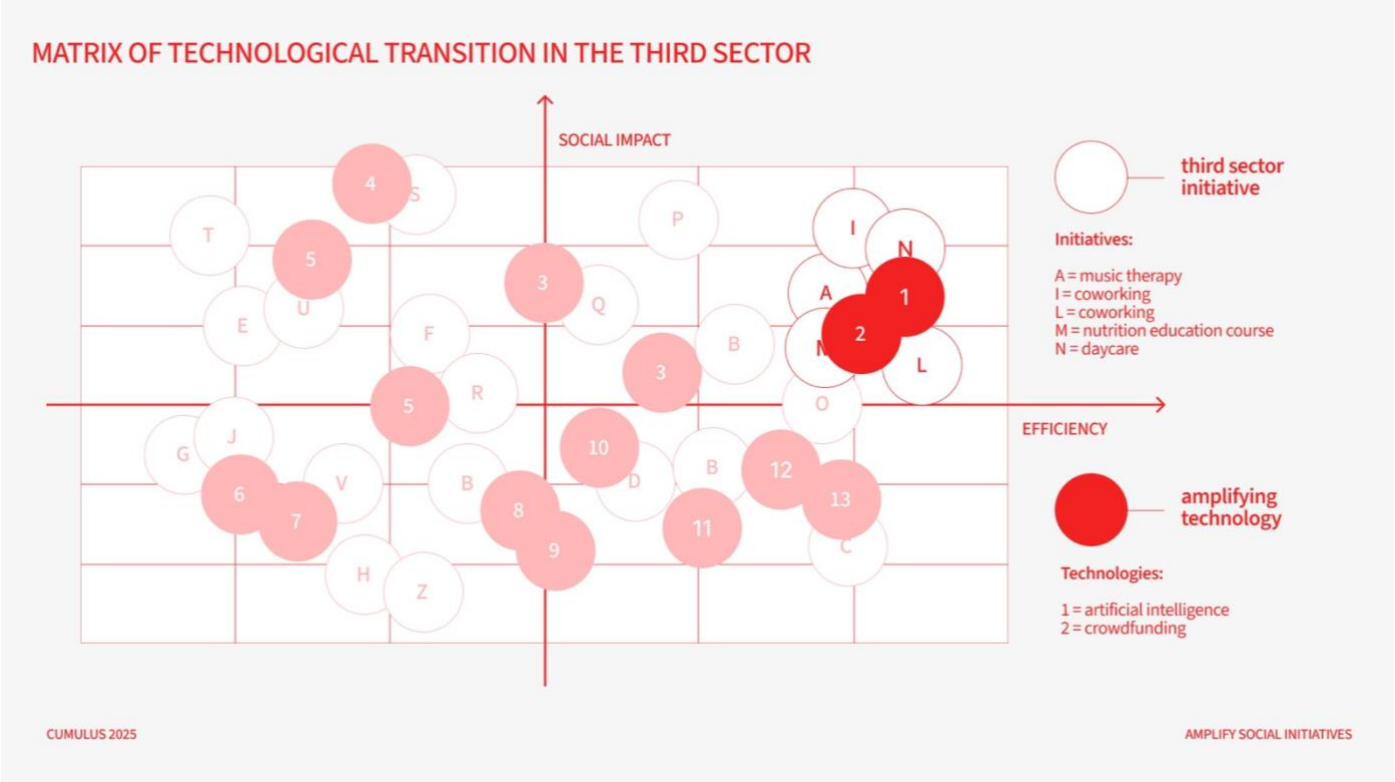

Figure 2. Cartesian matrix diagram (x-axis = social impact; y-axis = economic efficiency) of the relationship between technologies and Third Sector initiatives extracted from the fieldwork, highlighting a link between findings from the qualitative and desk analysis.

4.2 Between social *impact-oriented* and *efficiency-oriented* technologies: qualitative survey

The qualitative survey was conducted in the form of semi-structured interviews aimed at a sample of 6 operators (2 for each entity) belonging to the project partner enterprises. The duration of the interviews, conducted in person at the headquarters of the partner entities, ranged from 1h to 1h30. After transcription of the interviews, we cross-checked the results produced based on a previously designed codebook.
As a result of the interviews, all the entities placed their vocation somewhere between the desire to trigger social change in their target territory and their need to survive in productive and economic terms. It is necessary to note how the questions logically implied the impossibility of untying the two directions. However, as the interviews progressed, it became clear that the frame of the problem was the structure of communication itself.

Dissatisfaction concerns particularly the incapacity of being able to talk about their initiatives and about the inadequacy toward standardized content typical of corporate and marketing communication. Unmaintained and poorly managed websites and social profiles - 47.8 percent are not optimized therefore invisible on the web (Italy Nonprofit, 2024) – are the clearest evidence of the gap between the Third Sector's digitalization needs and the response offered by standardized platforms designed to replicate the private sector's agility and proactivity in response to changes and emerging challenges (Parsons, 2006). The question is not whether to have a web or social presence in the form of a *showcase*, but to define what is important to communicate to the specific target audience and based on that to understand the opportunities offered by the digital ecosystem. These insights guide the new design focus of the project: from an ecosystem

for communicating Third Sector entities to an ecosystem for communicating Third Sector initiatives.
To investigate more deeply this new focus, we scheduled new qualitative meetings in the form of focus groups where we deepen this understanding.
What emerges is that individual initiatives are the core of the social activities of our partners in which they invest the most time and energy. Moreover, for these organizations, embarking on a design journey means deciding to devote even more time, energy and resources to their desire for change The long time spent on problem-framing involves a deep discussion of the initial design question and brings out broader issues and needs that could steer the project towards more articulated and strategic interventions in terms of change and impact (Seravalli, Upadhyaya & Ernits, 2022). This shift becomes particularly clear in the initial stages of the project (Di Prima & Campagnaro, 2023) when members of the organization are asked to tell their stories to the design team, to share principles and values, and to describe the horizon of change towards which they are directed. As a result of the activities, we defined the problem framework and identified the trigger for the second diamond of the design process: using digital tools – described in the next chapters – to strengthen the communication of social innovation initiatives, as explained in the next section.

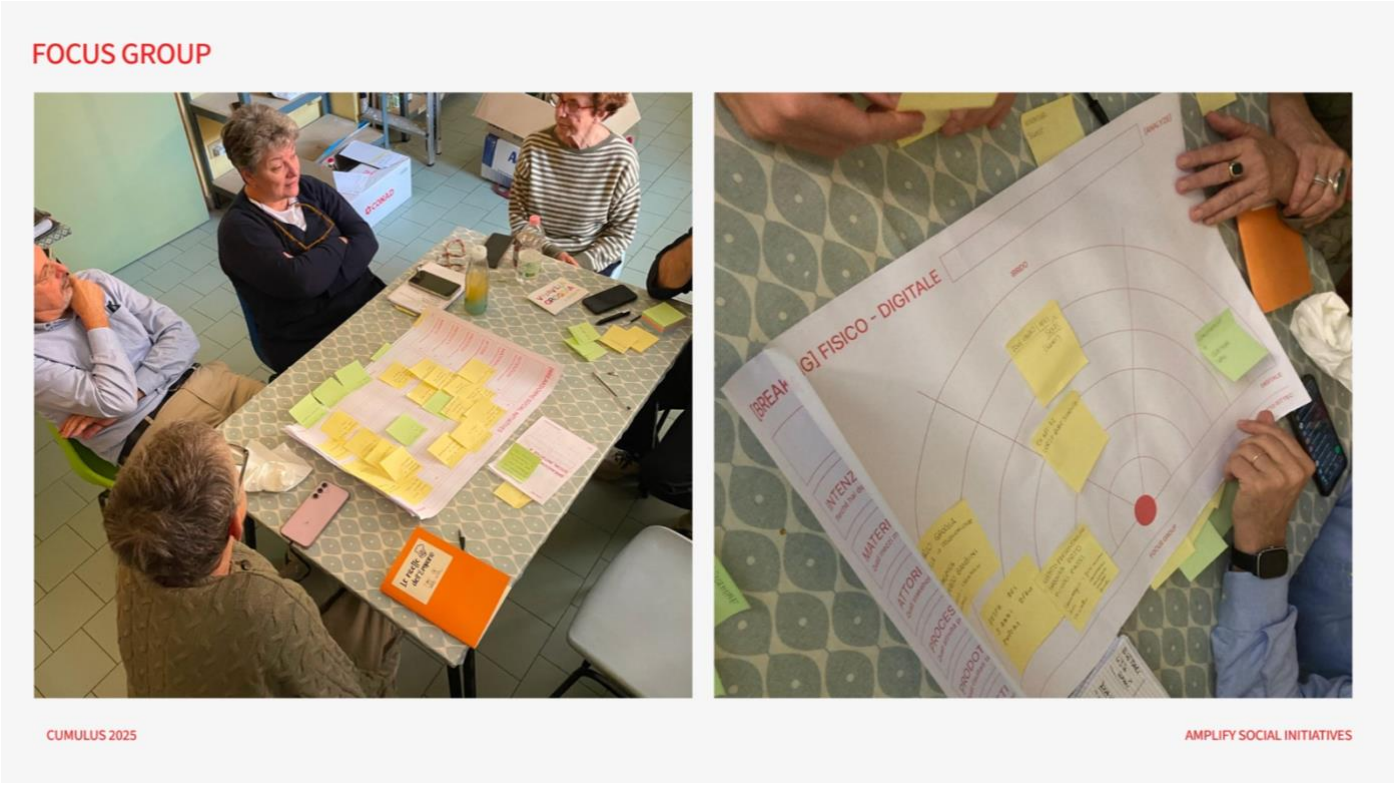

Figure 3. One of the focus group activities where the prototyped tools such as 'brainwriting', 'decomposition of initiatives' and 'mapping of contact points' were tested at the voluntary association 'Corte del Forner', Venice, 22 October 2024.

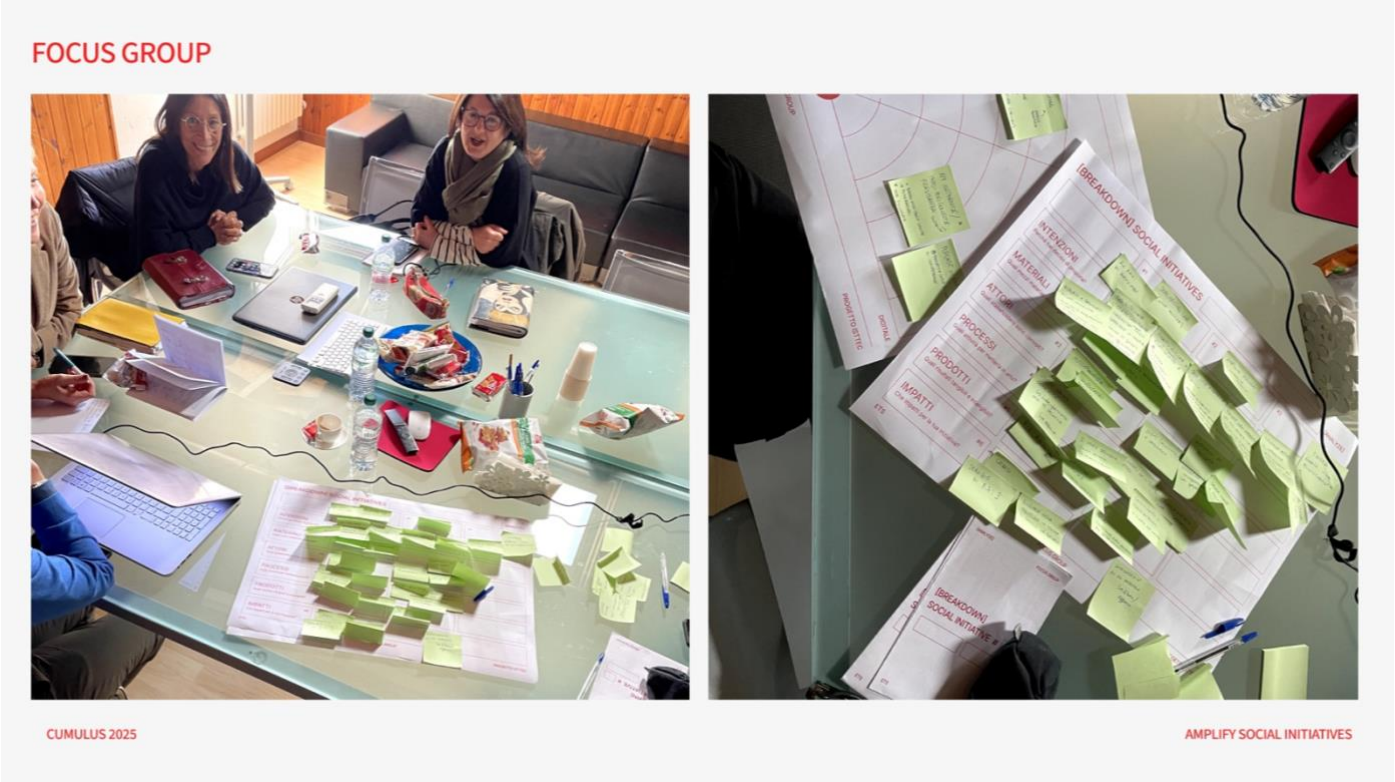

Figure 4. One of the focus group activities during which tested some of prototyped tools such as 'brainwriting', 'breakdown initiatives' and 'mapping touchpoints' at Social Cooperative 'Comunità di Venezia', Venezia, November 12nd 2024

5. A design logical framework to drive social impact

5.1 Social initiative as a driver for social and digital innovation

While the Third Sector possesses inherent innovative potential in social service delivery, its digital and social innovation capacity is significantly constrained by a disconnect between *unconscious design actions* (Manzini, 2014) and *intentional strategic planning* (Vink, et al, 2020), necessitating a fundamental shift from reactive service provision to proactive design-driven innovation supported by systematic frameworks and organizational learning. The resulting approach contradicts the sector's inherent ability to generate social innovation and positive community impact. What emerges is therefore to interpret this transition not as merely a technological hurdle but rather as an opportunity to transpose social impact into a digital context while designing solutions that catalyze transformative processes in welfare, social cohesion, and local impact.
Third Sector organizations demonstrate natural innovative capabilities in developing services for vulnerable populations. However, as Campagnaro (2022) observes, many organizations undertake *unconscious design actions,* responding to immediate needs without recognizing their design capacity or familiarity with design-thinking approaches. Third Sector organizations, in fact, are uniquely positioned to weave these networks of relationships, particularly in an era where globalization tends to fragment social connections (Bassi, 2013). This creates a paradoxical situation where organizations are innovating without acknowledging or strategically leveraging their innovative potential. Adopting the initiative as an object of the research means to revitalize the role of the Third Sector by operating at the level of *sense-making* (Rogers, 1995), identifying a solution which lies in adopting a co-design approach that facilitates both social initiatives and digital integration.

5.2 Initiative as design action

In contemporary literature, design is increasingly conceptualized as a *reflective* and *reformative tool* (Vink et al, 2020) capable of transforming ideas and initiatives into tangible actions with meaningful social impact (Busacca, 2019). The deliberate nature of design action provides a framework for organizations to progress beyond reactive responses toward strategic innovation. Organizations, therefore, should not be perceived as static entities but as emergent realities shaped by flows of action, negotiations, conflicts, and practical activities (Gherardi & Nicolini, 2004). This perspective aligns with the evolving nature of service design, which increasingly emphasizes "designing" rather than "design" to underscore its iterative and dynamic characteristics.

A central challenge in the digital transition of the Third Sector is bridging the gap between intuitive social action and strategic design thinking. Many organizations in the sector unknowingly engage in what Vink (2020) describes as *reflexive reformative actions*, often without recognizing their inherent design capabilities. Transitioning from *unconscious initiatives* to *deliberate design action* represents a critical step in enhancing organizational capabilities. The concept of ecosystem design broadens the notion of agency, recognizing the contributions of diverse actors, including those not directly involved in formal design processes. The following framework combines the *expert design capabilities* (Manzini, 2015) and the *distributed practices* of social innovation to bridge the unconscious potential of social initiatives into intentional co-created design actions.

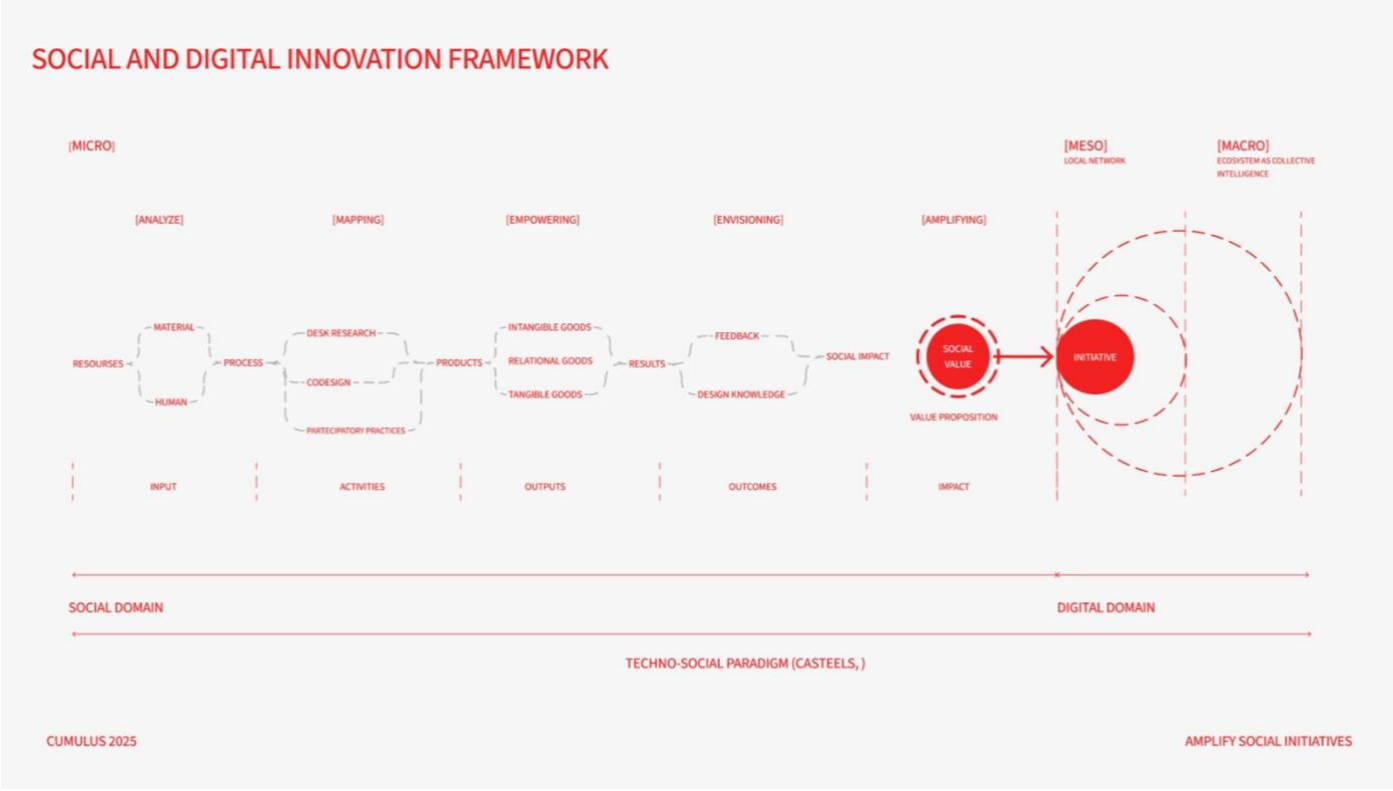

Figure 5. This framework proposes a theoretical and practical model for amplifying the impact of social initiatives in an ecosystemic way. Combining the value chain model with design thinking, it aims to scale up social value in the digital ecosystem through controlled phases.

This framework allows us to examine initiatives through both their design intent and their capacity to generate social value and impact. We propose a *multi-level model* for designing social initiatives that illuminates the complex dynamics in digital transition by strengthening impact awareness through prototyping and communicating initiatives.

While design initially focuses on solving specific problems and creating tangible artifacts or interactions it can also drive deeper cultural, strategic, and systemic transformations. These transformations influence processes, mindsets, and organizational structures (Burns et al, 2006) and mark the transition from *expert design* to *diffuse design*. The primary goal of this framework is to create a common ground between social and digital environments to help organizations reconsider service transformation from a new perspective: fostering a shared multilevel ecosystem that consolidates best practices, resources, and tools.

5.3 From social initiatives framework to digital ecosystem model

At the local level, social innovation emerges through peer-to-peer initiatives and the active engagement of actors, involving territorial observation and community building efforts that foster belonging, solidarity and participation (Bassi, 2011). By integrating the structure of the Design Process Model (IDEO, 2012) with the basic principles of the value chain model, the framework made visible the *iterative nature* of design processes to identify a distinctive value that organizations seek to achieve by focusing on their activities. In doing so, the micro level highlights the main steps towards the co-creation of social value within a social initiative, contributing to be a fundamental analytical phase to understand the actors, resources, processes, and agents involved in the creation of relational products.

The meso-level bridges global and local knowledge through bidirectional innovation transfer. Initiatives generate relational products, fostering shared responsibility in local participation. This, in turn, strengthens community members' sense of belonging and forms the foundation for an infrastructural network that aggregates data on a global scale. At the intersection of the micro and meso-levels, two key mechanisms emerge. First, social learning and critical mass mechanisms (Rogers, 1995) drive the development of collective knowledge and enhance meaningful participation at the micro level (Mulgan, 2017). Second, *social capital* and *relational products* (Bassi, 2013) establish the foundation for trust and long-term relationships, enabling effective collaboration in public spaces—ranging from individual initiatives to broader initiative networks.
This level represents the institutional dimension. The role of the digital ecosystem is to enable processes that were previously inconceivable, activating community agency by empowering audiences to solve problems using their own skills and resources (Mulgan, 2006). It manages networks across multiple levels, fostering collaboration and innovation. Consequently, the role of design evolves from merely creating solutions to orchestrating processes, enabling systemic approaches that integrate infrastructures, resources, and users.
At the macro level, digital innovation focuses on social accountability, impact measurement, and the dissemination of best practices (Mulgan, 2017). When effectively managed, these global processes generate social capital, enhancing collective intelligence and knowledge-sharing across communities. The following digital ecosystem we conceptualize for social innovation further amplifies these effects.

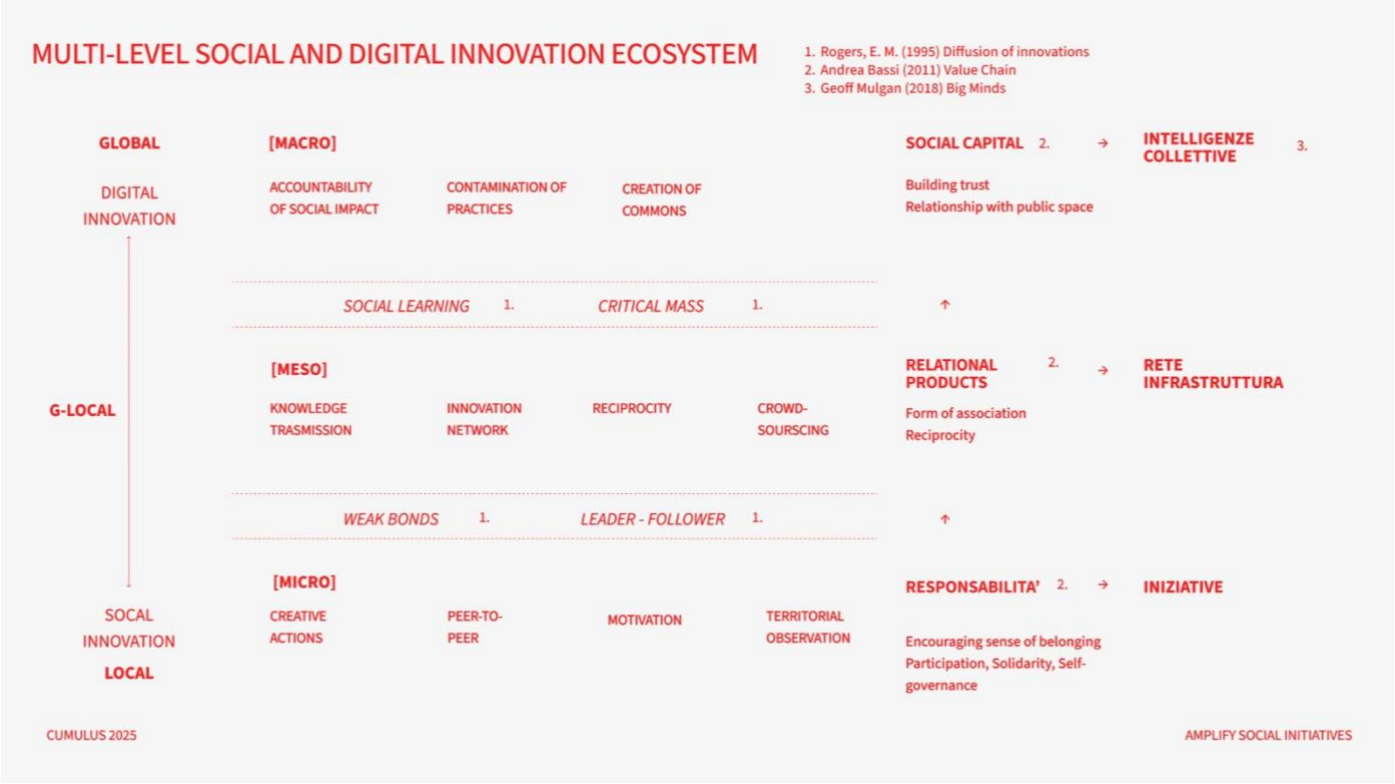

Figure 6. The multi-level social and digital ecosystem aims to scale up social innovation efforts into an integrated digital ecosystem, linking the micro-level (initiatives), the meso-level (network) and the macro-level (ecosystem), enacting virtual practices such as knowledge transmission and social learning.

6. New design focus: 'Amplify Social Initiatives' ecosystem

'Amplify Social Initiatives' aims to explore and give a digital place to the *constellation of design initiatives* (Manzini, 2014) as extensive as it is hidden (Author, 2022) carried out by Third Sector entities. An initiative is defined as any activity oriented toward the production of social innovation, where the latter is to be understood as the possible - and not necessary - outcome of complex social processes in which there is no predetermined relationship between patterns of partnership - roles, positions and functions of actors - and outcomes of the initiative in terms of collaborative dynamics (Granovetter 1974). The framework is designed to be an *operational tool* that guides an idea from the input to the outcome, and relative impacts, through a model of communication for social initiatives.

'Amplify Social Initiatives' is a toolkit platform – with possible analogic extensions - that supports Third Sector organizations involved in the digital transition process. It is a digital repository in the form of a guide, collecting ready-to-use tips, tools, and materials to implement and adapt the presence of digital communication within a social reality. It is suggested that the commitment should focus on creating a community, not only of advocates, but also of designers, to continuously influence this change. The common characteristic of transition design is the presence of *non-traditional design outcomes* (Burns, et al., 2006:21): although there are well-established tools to capture the experience of stakeholders in the service from multiple perspectives, each social innovation experience suggests reinventing the method, and with it the most suitable tools.
To support engagement and build trust in the design process (Junginger & Sangiorgi, 2009), our communication toolkit presented different uses of digital tools: (1) co-learning; (2) crowdsourcing; (3) codesigning. The model to which the platform would like to refer is that of *commons-based peer-production*, capable of harnessing decentralized *collective*

intelligence in open collaboration networks which occurs when experiences are created together or shared with others.

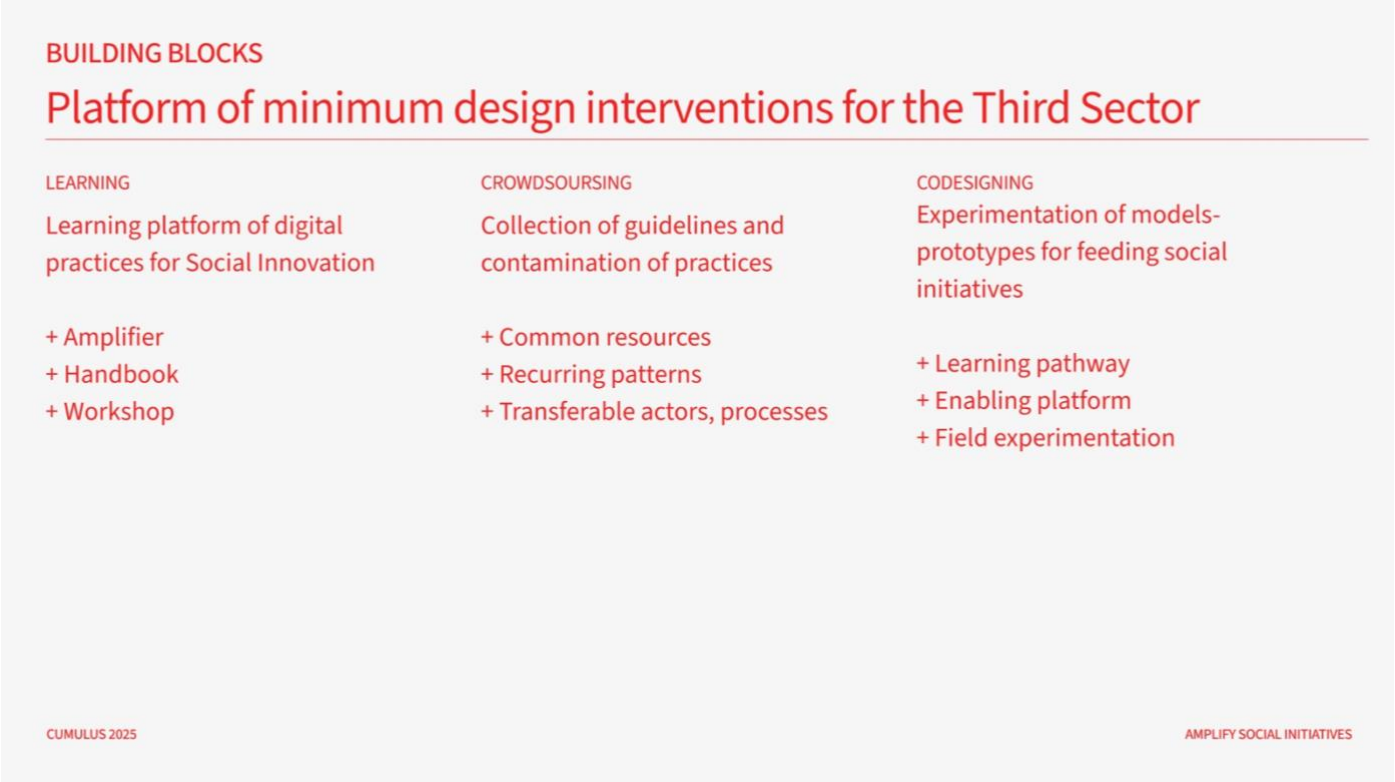

Figure 7. The program establishes a strategic social-digital capacity-building platform that integrates learning, crowdsourcing, and co-designing, utilizing digital infrastructure, educational resources, and interactive workshops to enhance organizational communication and knowledge transfer capabilities.

The toolkit platform emerges as a crucial enabler for bridging the gap between digital adoption and social innovation. By providing a comprehensive set of *tools, guidelines,* and *resources*, the platform enhances the communication capabilities of Third Sector entities, empowering them to navigate the complexities of the digital age. This long-term approach synthesizes user sessions, bridging the divide between grassroots initiatives and top-down digital transitions. By *steering* organizations towards digital adoption, the platform fosters interactions between designers and social innovation processes and facilitates iterative development through co-design thinking methodologies (Swann, 2002).

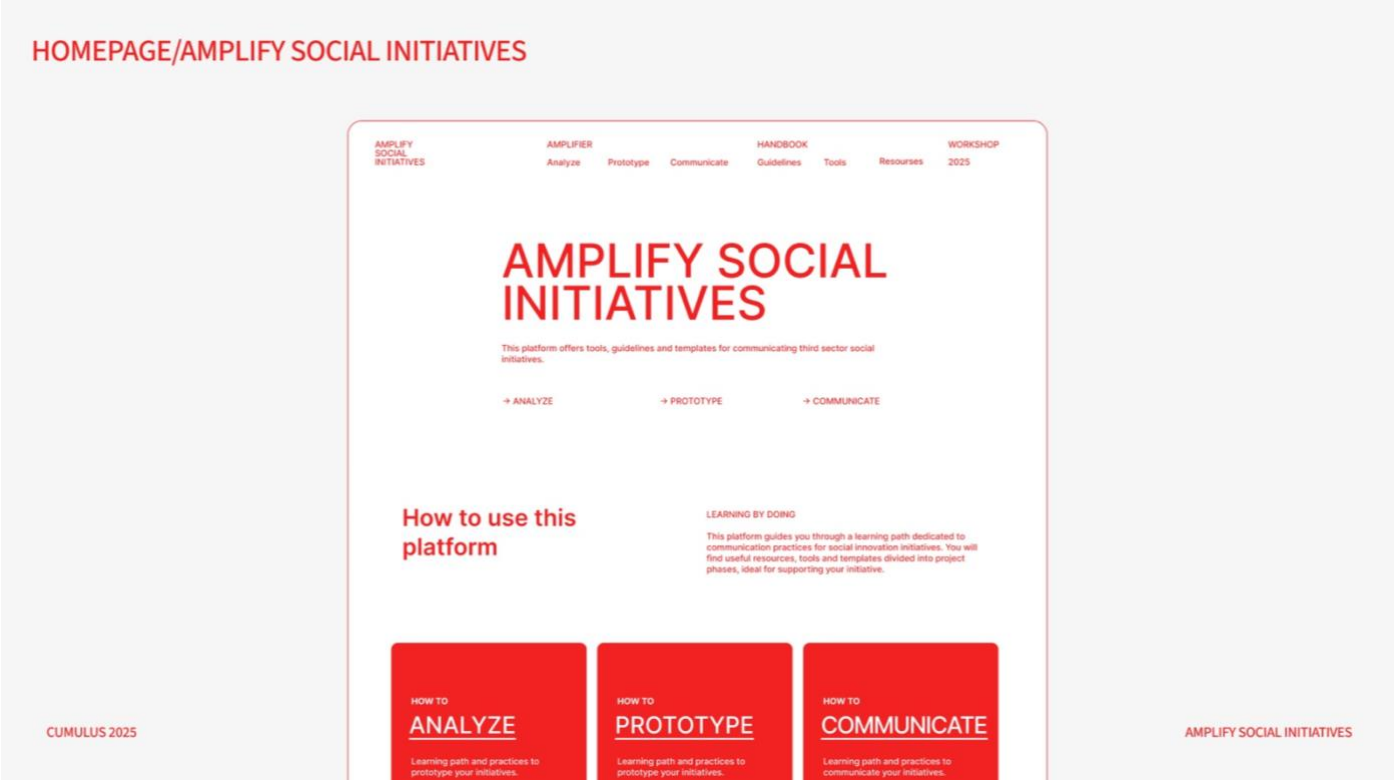

Figure 8. The Amplify Social Initiatives platform acts as an amplifier of social innovation by providing communication tools to increase their social impact.

The platform also integrates a variety of specialized tools to support communication, including editorial outputs such as social media campaigns, newsletters, and podcasts; organizational tools like email marketing and broadcast lists; and fundraising resources such as crowdfunding campaigns and donation drives. These tools are clustered into editorial, organizational, and strategic categories, providing a flexible and comprehensive framework for addressing the diverse needs of Third Sector organizations (Italia No Profit, 2024). By offering templates, guidelines, and resources tailored to each cluster, the platform enables organizations to craft effective communication strategies and amplify the reach of their initiatives. The platform functions as a dynamic *learning process*, reflecting the co-design thinking methodology employed during the research phase. It introduces organizations to a *three-step framework*—analyze, prototype, and amplify—that has been rigorously tested in on-field research.

The 'analyze' phase includes tools designed to deconstruct and map social initiatives, creating communication design frameworks that support the effective articulation of their goals and impacts. It provides an analytical framework without restricting the creative and proactive freedom of participants as a *true experimental tool* (Foster & Iaione, 2016). The result of the analyze phase is the unpackage of social initiative:

- *Brainwriting tool*: participants are invited to bring up as many past and current initiatives of their respective association as possible, proposing to write their title on a post it notes to be randomly stuck on the wall;
- *Breakdown tool*: participants are invited to answer the questions corresponding to the distinct phases of the initiatives and then to break them down into the various components that compose the value chain (human/material inputs, activities, outputs);
- *Mapping tool*: participants are invited to think about each phase of the initiatives and write down the corresponding digital touchpoints involved in the communication of the initiative development process.

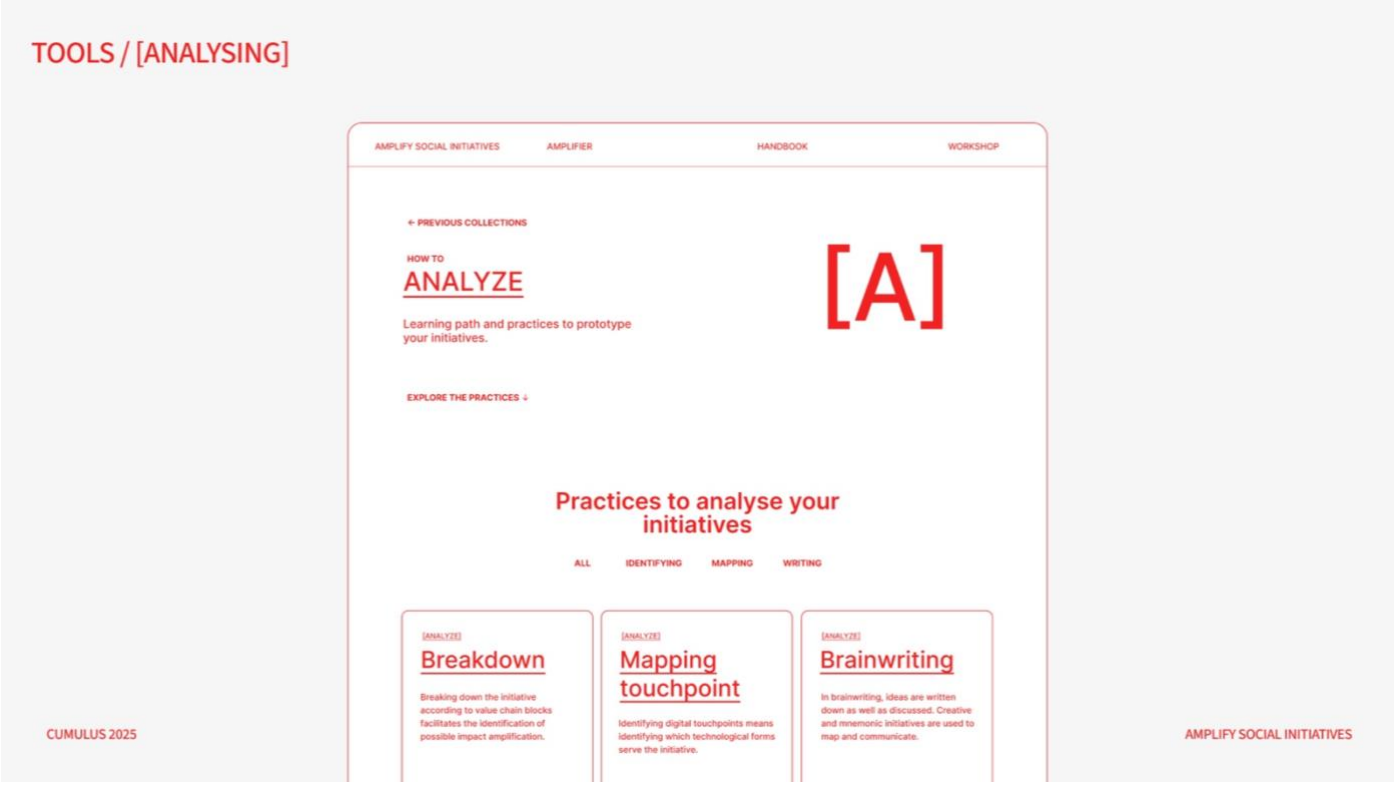

Figure 9. The platform is clustered by collecting all the tools and resources to enhance the methodological and learning approach and content findability.

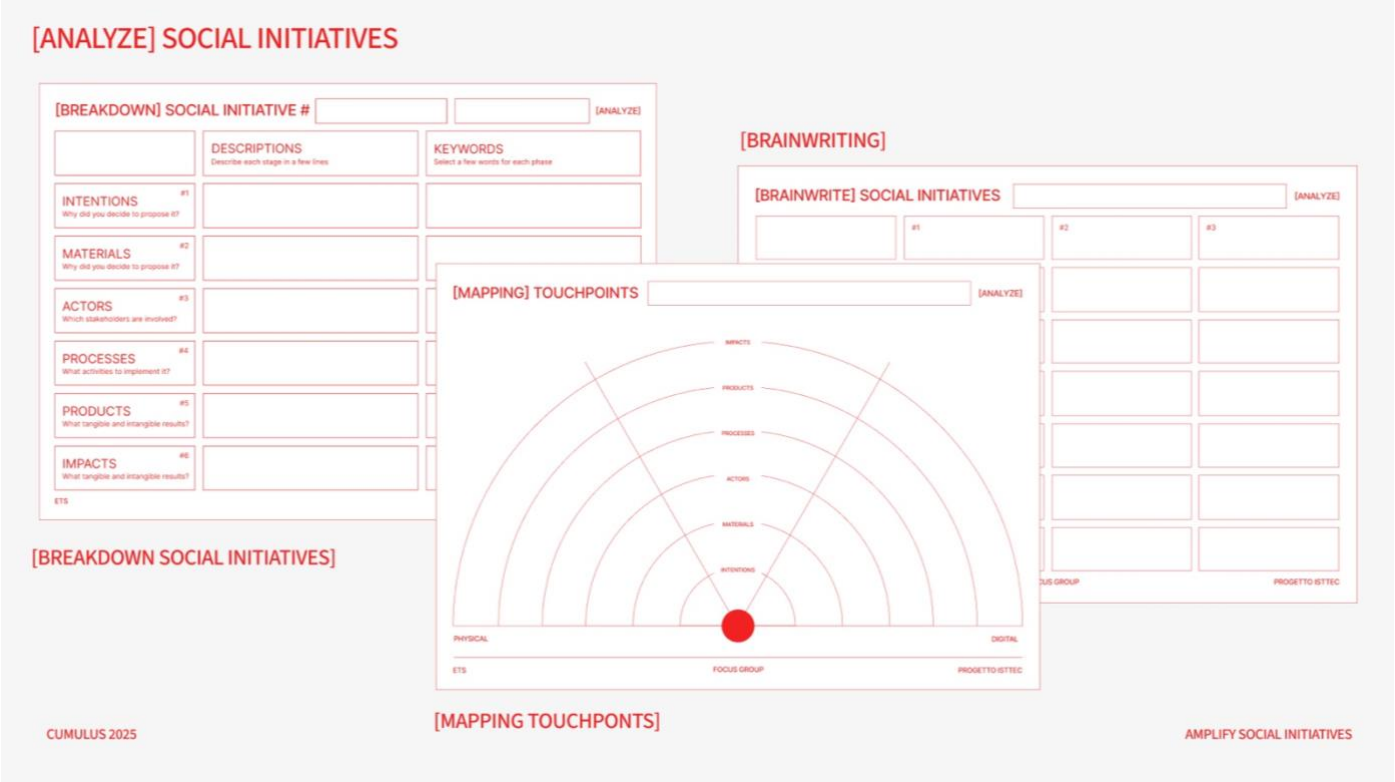

Figure 10. Collaborative design tools such as 'breakdown social initiatives', 'mapping touchpoints' and 'brainwriting' have been prototyped and tested to analyze social initiatives of the Third Sector.

The importance of prototyping underlined by Campagnaro (2022) in these contexts, highlights this iterative process that empowers Third Sector entities to adopt a strategic mindset that integrates digital tools into their operations effectively.

- *Identifying needs tool*: each card presents possible insights into the difficulties faced by third sector actors in unravelling the communication of an initiative, and participants are asked to select some or write down others;
- *Choose technology tool*: each card proposes a 'bio' of the technology (what it is) and a description of how it works (how to use it), so the participants are asked to choose the one they consider more relevant for their initiative.

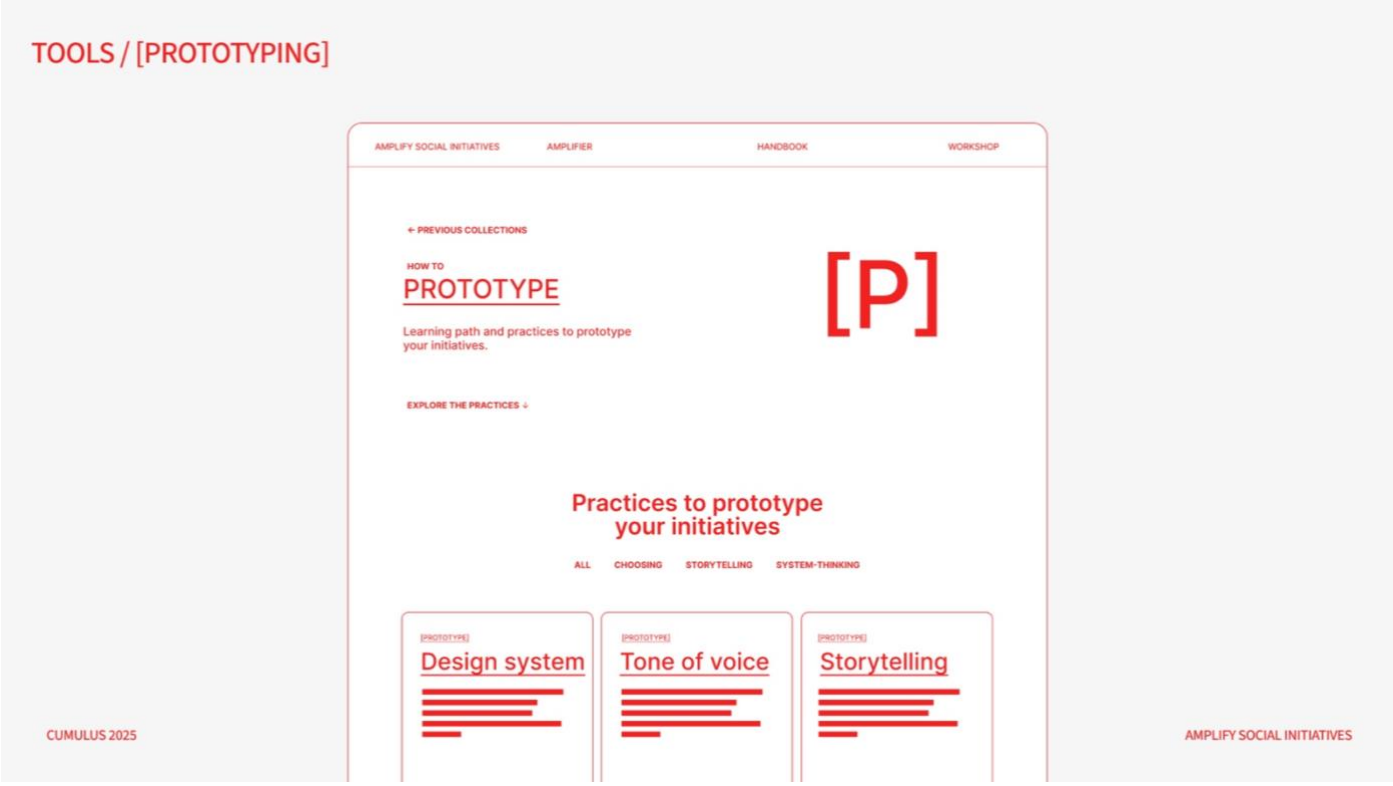

Figure 11. The platform provides intermediate tools for prototyping the initiatives, suggesting non-final outcomes but systemic and storytelling approaches to define their own tone of voice.

Figure 12. Collaborative design tools such as 'choose technology' and 'identify needs' have been prototyped and tested to guide the Third Sector in matching the best technological solution to the related problem associated with social initiatives previously analyzed.

The toolkit platform integrates a diverse range of communication outputs designed to bridge the digital divide and enhance the reach and impact of social initiatives within target communities. These outputs are organized into three main clusters:

- *Editorial oriented tools*: these tools refer to technologies and channels oriented to build a communication of initiatives that is continuous over time (e.g. newsletters, social media, podcasts);
- *Organizational oriented tools*: these tools act as facilitators of certain organizational and internal communication practices of the various service components (e.g. WhatsApp groups, broadcast lists);
- *Strategic oriented tools*: these tools assist in the use of purpose-driven technologies (e.g. crowdfunding campaigns, fundraising events, donation drives).

Such resources enable organizations to design and implement effective communication plans, ensuring that their initiatives resonate with their target audiences and achieve their intended impact. This structured approach not only amplifies individual initiatives but also contributes to overcoming persistent challenges in the sector, fostering greater social innovation and value creation.

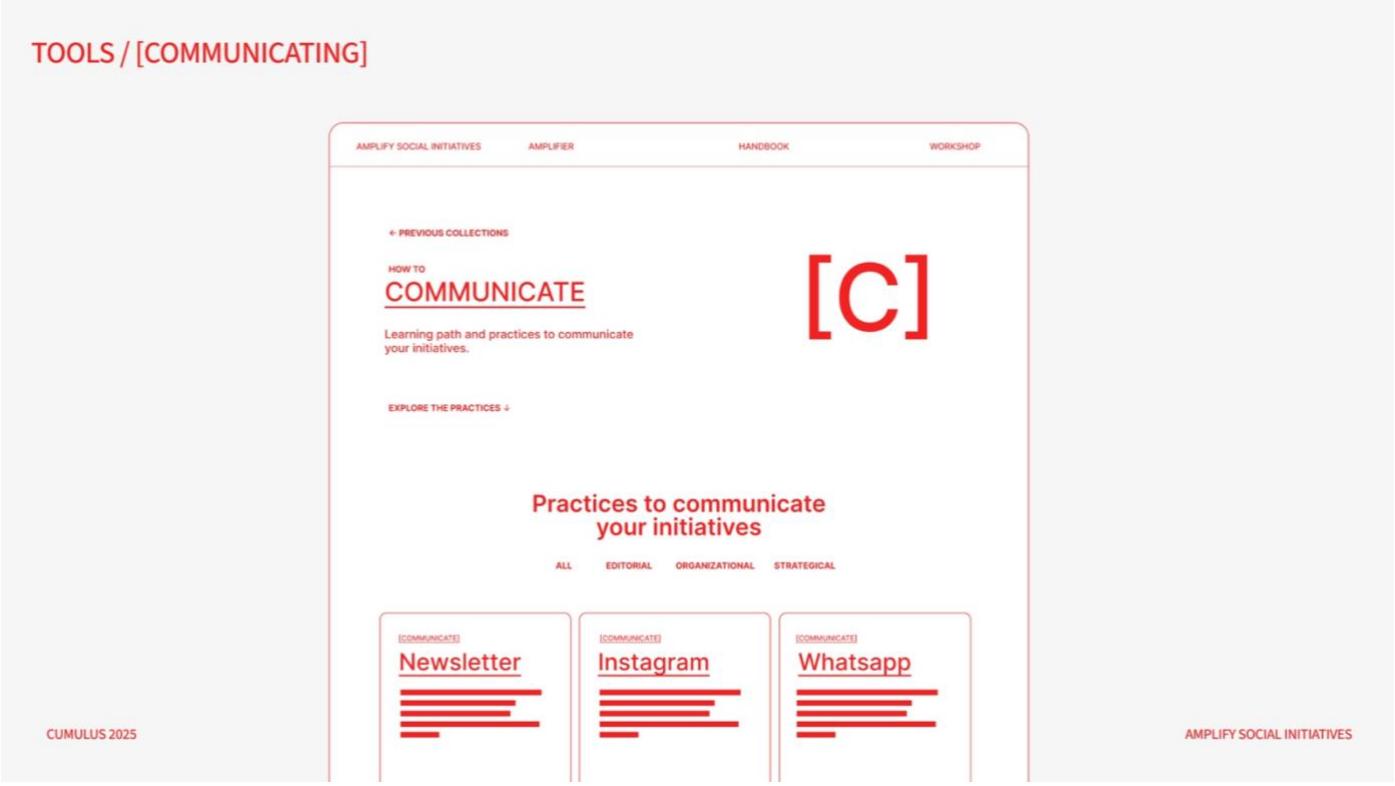

Figure 13. The platform proposes a series of communication outputs and provides specific guidelines for structuring newsletters, social media and organizational communications.

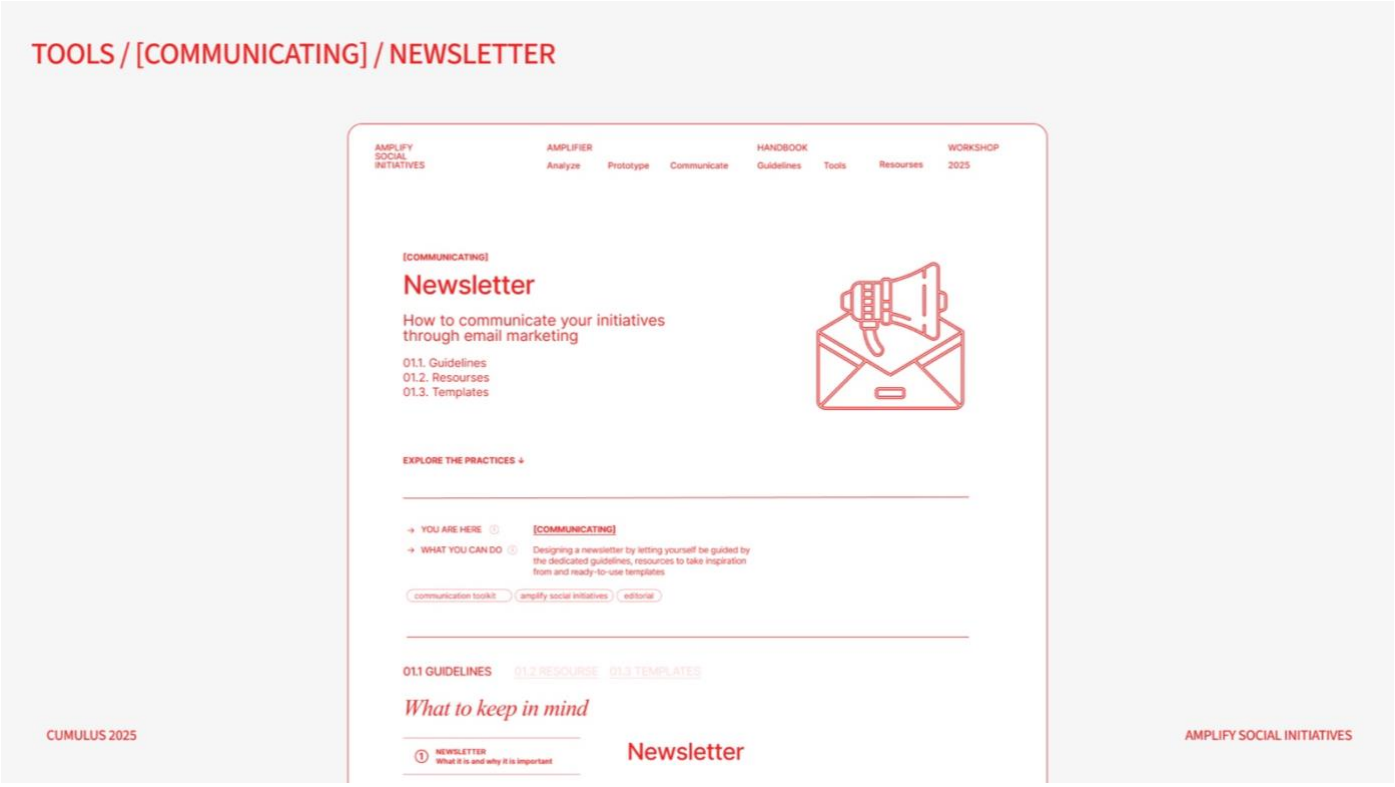

Figure 14. Communication tools provide different ways (guidelines, resources and templates) to guide social initiatives, previously analyzed and prototyped, to create different communication outputs, such as newsletters (for example).

Figure 15. One of the possible communication outputs is the newsletter, for which the platform proposes different tools (guidelines, resources, and templates) to guide its creation, depending on the level of competence and energy available.

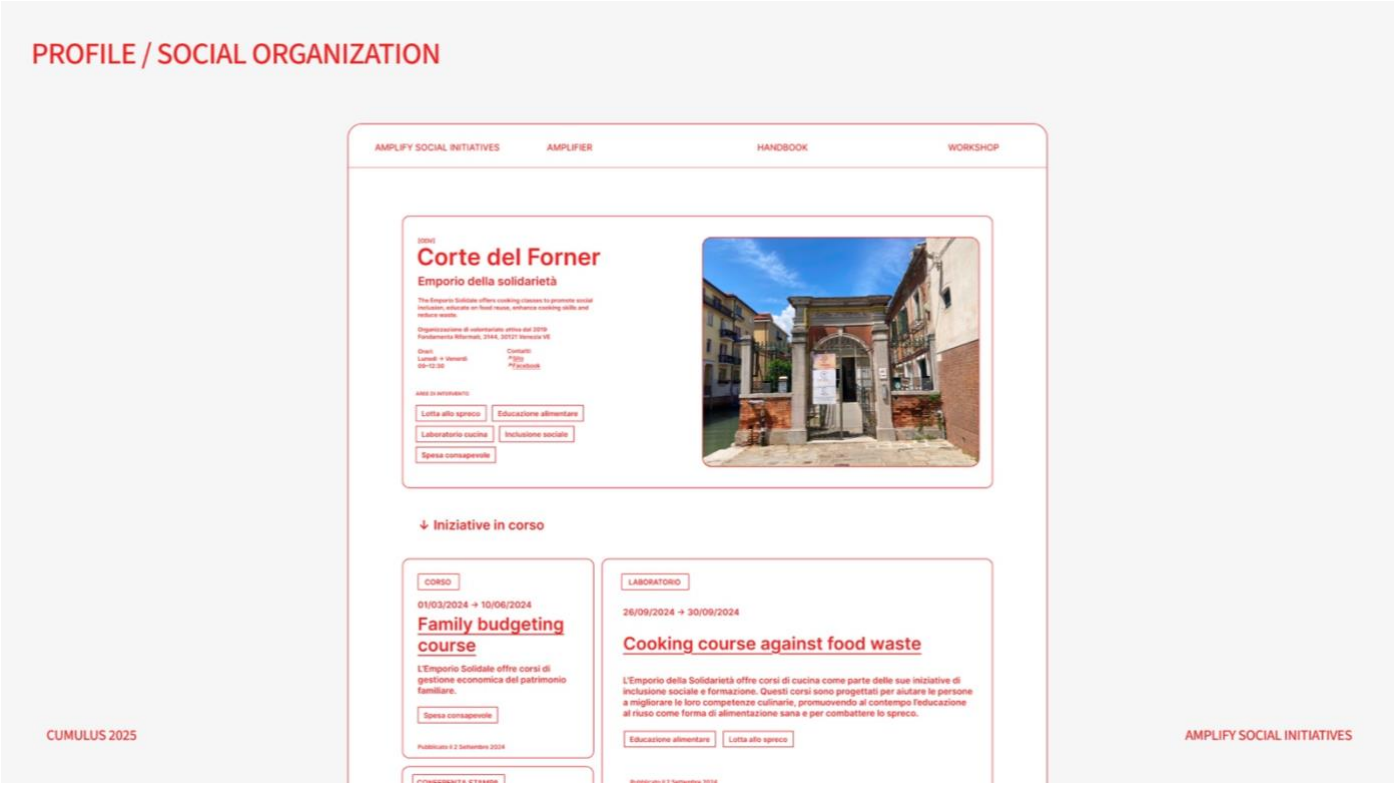

Figure 16. The interface design prioritizes the action-oriented presentation of content, moving from identity-centric models to an activity-based demonstration of organizational values through documented social impact initiatives.

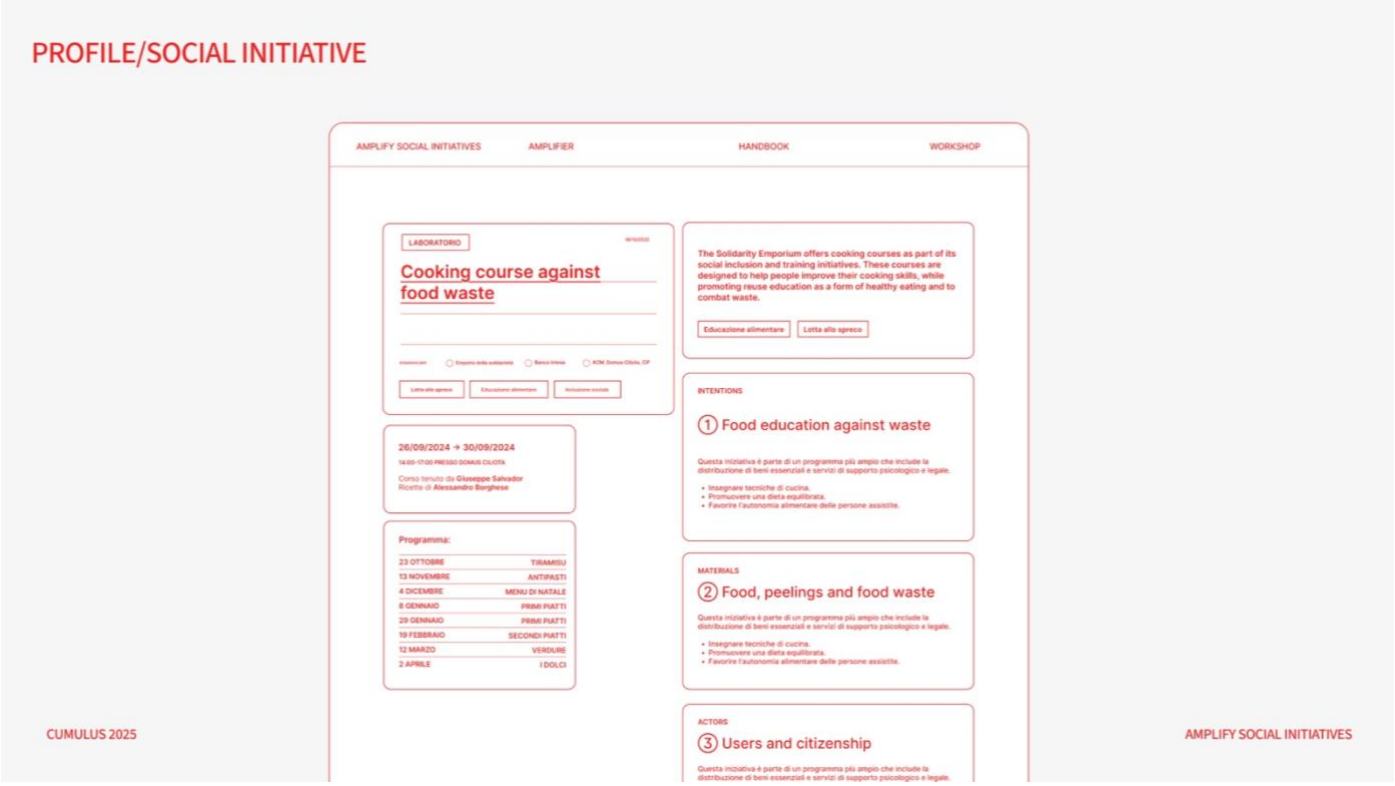

Figure 17. The initiative interface uses the value chain framework to structure and present operational information, enabling an architectural organization of initiative components, serving as modular building blocks for project replication and facilitating a crowdsourcing methodology.

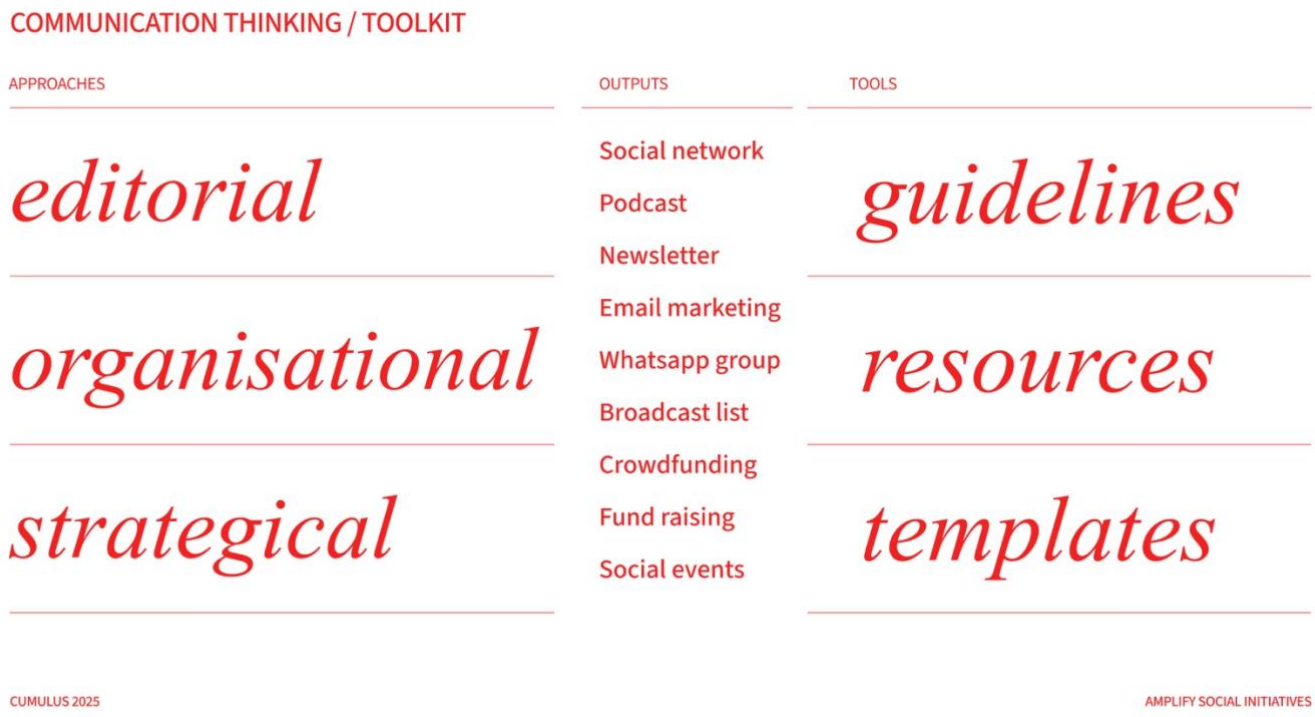

Figure 18. The Communications Toolkit addresses critical operational gaps in the third sector through an integrated digital communications framework. Encompassing strategic planning, organizational development and capacity building, it ideally addresses all these challenges while providing targeted implementation resources designed to increase the impact of existing social innovation initiatives.

7.Initiative as design action

On-field research, in line with the state of the art in the Third Sector, identifies a key barrier to digital transition: intrinsic resistance to adopting digital communication tools, primarily due to constraints in time and digital competence. This challenge is exacerbated by the sector's limited funding and pressing operational priorities (Italia No Profit, 2024). Manzini (2024) observes that successful social innovation demands significant stakeholder engagement, time, and commitment — resources that are often unavailable without robust policy support as our on-field research showed as well.
The limitations of a *technology-first approach* become evident when examining the findings of this article. The assumption that technological solutions automatically improve the communication capacities of the Third Sector overlooks crucial structural and social complexities. This technological determinism, as discussed by Harari and recently expanded upon by Author (2024), fails to account for the sector's unique challenges and limitations. While digital platforms can be a cost-effective infrastructure and enact behavioral change, they cannot independently address the structural and political challenges of supporting long-lasting impact in the Third Sector. As Vink argues (2020), meaningful systemic change requires comprehensive policy frameworks and socio-economic arrangements that extend beyond technological and design solutions. To drive meaningful change, public policies must embody innovative governance. As Manzini and Selloni (2016) propose, policies should form *policy constellations*, or clusters of initiatives, capable of positively interacting with the socio-technical systems they aim to influence. This ecosystemic approach to policy design highlights the need for long-term, socio-political commitment. The introduction of the 'National Single Registry for the Third Sector '(RUNTS) - introduced in the Italian 'Third Sector Reform' (2017) - has increased bureaucratic requirements without providing adequate support for the digital transition, failing to capture the dynamic and evolving nature of the sector and enabling a comprehensive analysis and observation of the sector. This exemplifies the *digital-imperative* main problem: the lack of digital standards and resources to support their implementation. Furthermore, both the literature and field research show that initiatives are at the core of social innovation and reveal a mismatch between the Third Sector entities mapped in RUNTS registry and the actual social innovation initiatives being developed. 'Amplify Social Initiatives' aims to intercept them with a tested theoretical-practical framework driven by design.

As mentioned above, the *quadruple helix model* emphasizes the importance of public governance and its crucial role of synergy between the State and the Third Sector, as well as citizens and local authorities, in promoting a sustainable ecosystem that supports social objectives. Public policies that raise awareness about social problems and support social innovation initiatives (Nesta, 2016) should help address these challenges. This process involves the creation of *collaborative public services* (Manzini & D', 2024) that integrate design-driven stakeholder engagement and local capacity to produce *collective goods* (Crouch et al, 2004). However, without a solid regulatory framework, initiatives are at risk of failure and attempts to be more probable, effective, durable and scalable and to become true *collective benefits*.

The implementation of collaborative tools, therefore, becomes crucial not just for operational efficiency, but as a catalyst for organizational learning and capacity building in which designers are mediators and facilitators, supporting ongoing initiatives and socially meaningful design projects (Manzini, 2014). This approach can help bridge the existing digital competency gap while fostering a more technologically adaptive culture

only in the conception of *digital common* empowering the empowerment of self-governance through a non-exclusive use of resources. Therefore, 'Amplify Social Initiatives' can be considered as a *trigger space* (Ostanel, 2017) not necessarily a physical space but as collector places of social energy. In this way they become at the same time laboratories of co-design and spaces to produce collective services which tend to scale up social innovation and amplify the impact of the often *unmapped* (author, 2022) network of small-scale design actions.

8. Conclusions

In conclusion, communication for social innovation can be conceptualized as a fundamental element in the architecture of social relations, establishing itself as an essential instrument to *produce sociality* (Ascoli, 1999). This theoretical perspective is grounded in the premise that communication is not merely a process of information transmission, but rather a catalyst that generates *social bonds*, thus contributing to the weaving of contemporary *social fabric* (Bassi, 2013). Within the context of social innovation, this conception takes particular significance as it highlights the transformative potential intrinsic to communication itself. Defining communication for the Third Sector as an expression of diffused or organized *relational phenomena* (Binotto, 2010) requires the recognition of its preliminary nature of social roots and the understanding of its capacity to amplify social impact and to evolve in new communicative domains.
This theoretical perspective enables the examination of Communication for Social Innovation in the Third Sector in its authentic dimension, by generating interpersonal connections and social dynamics. Design for social innovation as a *transformative force* emphasizes the role of communication in fostering and sustaining social relationships.

'Amplify Social Initiatives' shows that the design intervention in digital transition necessitates a synthesis between the original datum of community union and the contemporary aspect of technology as a connector of *collective intelligence*. This evolution requires a redefinition of its vocational purpose and consequent methodologies, essentially returning to its fundamental social roots of communication (Binotto, 2010): being social energy collectors on a territorial scale.

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ethical leadership
a new frontier for design

L'ÉCOLE DE DESIGN Nantes Atlantique
Cumulus Association

PAPER SESSIONS **X-FORMAT**

CARE AND PUBLIC INNOVATIVE ACTION ISSUES

Managing new ethics of public design

Co-design and public policies for an educational equity in a secondary school

AUTHORS

Anna Majó Rossell
Lena Macau Sanz

JUNE 3-7, 2025

One framework:
Design as an act of determination
and an event of contamination

One practice:
How can design contribute to innovation
in a country's public education system?

One proposal:
What principles underpin
a dissenting attitude in design?

One framework:
Design as an act of determination and an event of contamination

Design, pedagogy and social transformation

design otherwise
framework otherwise

(Keshavarz, 2016)

Tasmim

design to **make a decision**

design as an act of **determination**
a process of classifying possibilities
and projecting choices

the designer assumes the role of
“decision-maker”

capacity to activate

(von Borries, 2020)

design as subjection

the political dimension of design

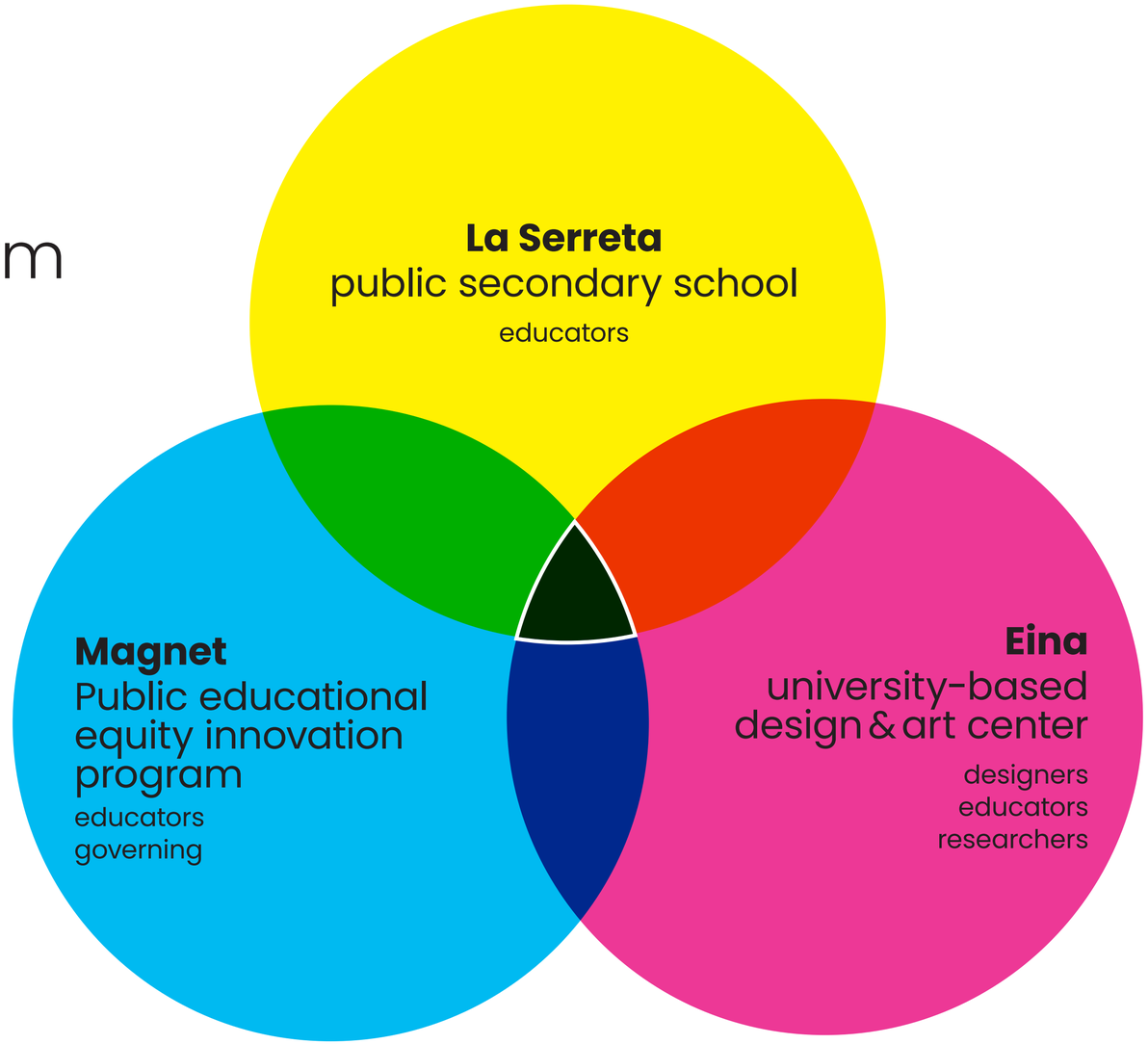
design as projection

Design practices’ contributions
thanks to framework turn:

the advancement of
social, political, and economic approaches to design
in response to
the profound global challenges of social instability

One practice:
How can design contribute to innovation in a country’s public education system?

collaboration as a form
of **contamination**



(Majó, 2021)

State and attitude of dissent:

1. Developing a critical perspective.
2. Engaging in deeper reflective practices.
3. Recognizing immaterial forms as legitimate design outcomes.
4. Emphasizing collectivity as a strategic approach.
5. Making visible, legitimizing, and constructing new narratives.

This approach activates:

The political essence of design; (von Borries, 2020)

designing through tasmim (Keshavarz, 2016)

as a conceptual framework to generate contaminating events (Tsing, 2021)

thereby fostering the emergence of preferable alternatives

Serreta Landscape, a tool designed to...

— facilitate exploration, analysis, decision-making, and planning.

— serves as a strategic and collaborative instrument for driving meaningful change in the culture of that public secondary school.

Methodological approach:

1. Engaging in theoretical dialogue with Latour (2020).
2. Conducting surveys with the secondary school teaching staff.
3. Analyzing the collected data through coding.
4. Visualization.

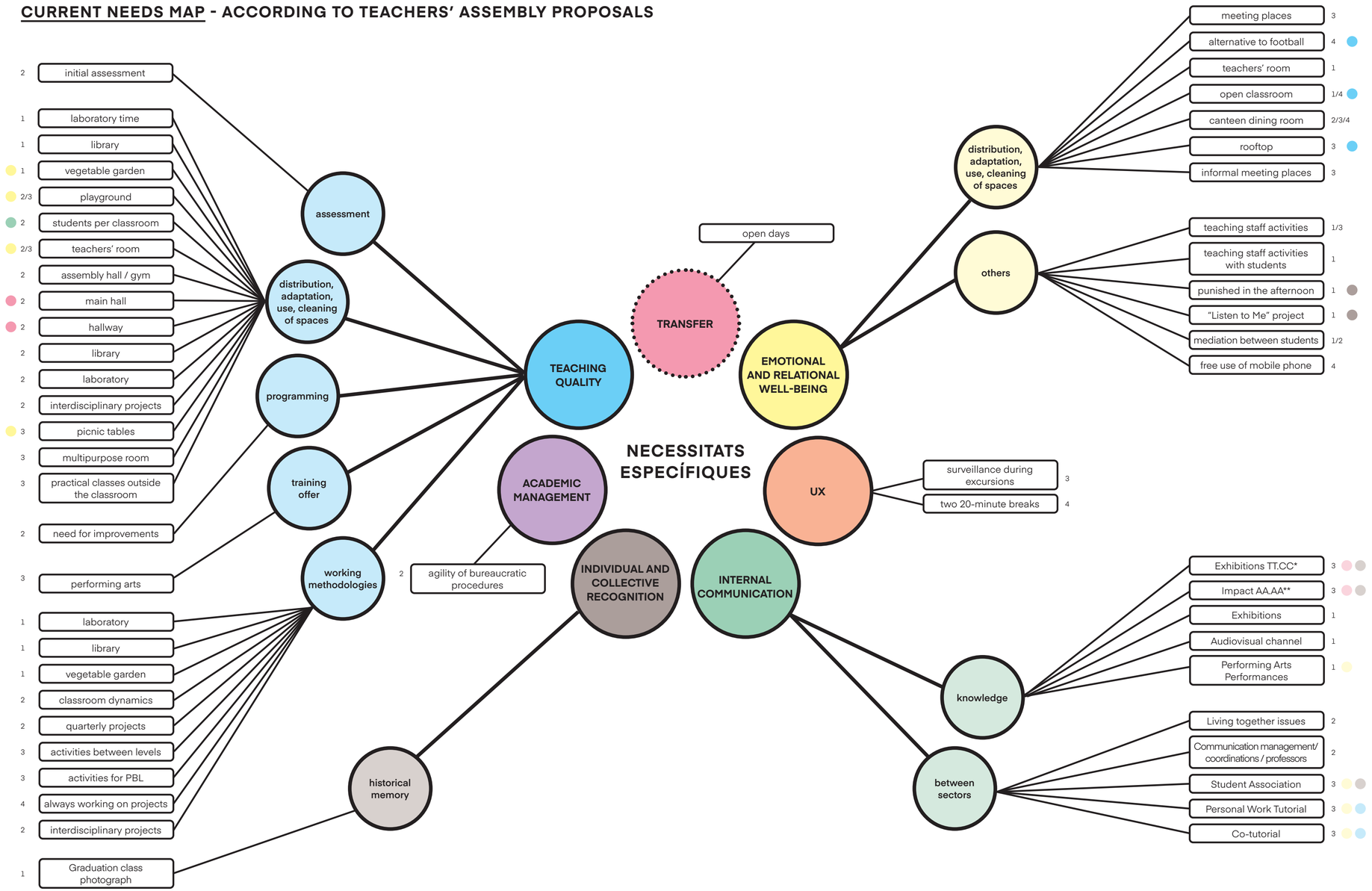


Figure 1. Serreta Landscape

SPECIFIC NEEDS - PRIORITIZATION ACCORDING TO TEACHERS' ASSEMBLY

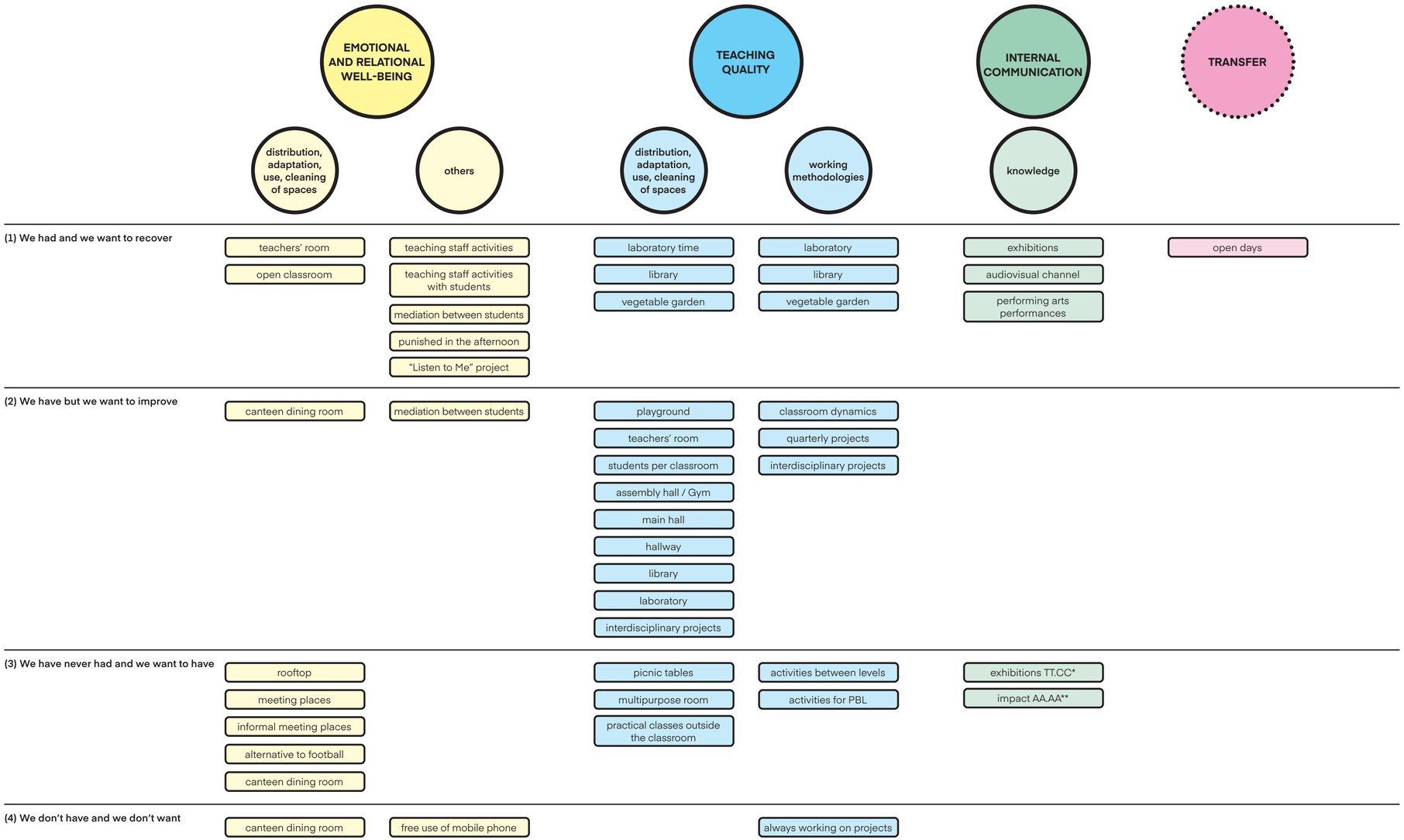


Figure 2. Version 1 of the Serreta Landscape made from a collaborative prioritization exercise.

WORK PLAN - ACORDING TO MAGNET ALIANCE

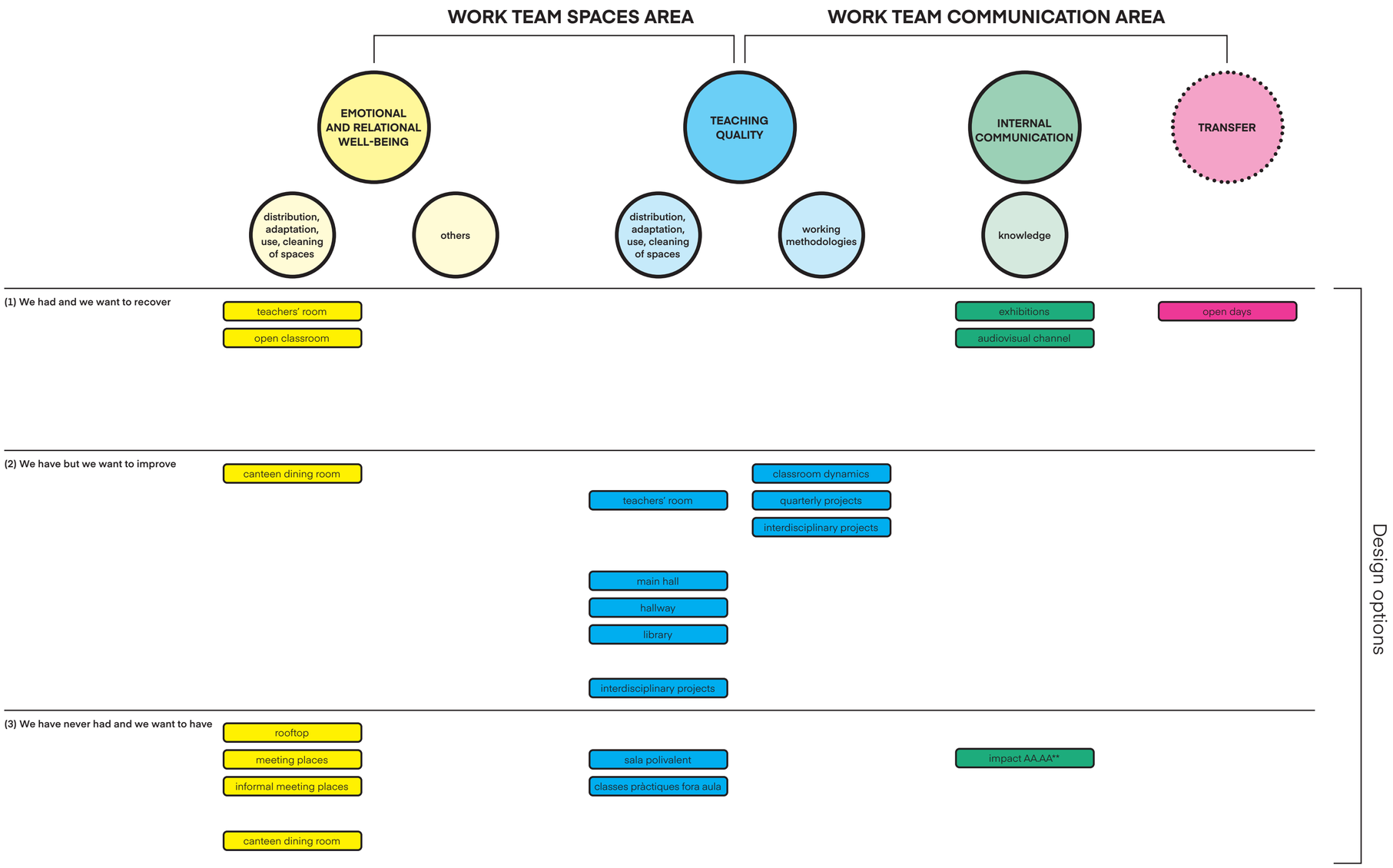


Figure 3. Work plan made from the possibilities of contamination between the allies.

One proposal:
What principles underpin a dissenting attitude in design?

What principles underpin a dissenting attitude in design?

Design as a form of activism?
Design as an intellectual commitment?
Design as a disruptive practice?

What role does ethics play in all of this?

the designer assumes the role of
“decision-maker”

capacity to activate

design
as subjection

the political dimension of design

design
as projection

State and attitude of dissent applied in design process

Critical perspectives

Deeper reflections

Immaterial forms (design outcomes)

Collectivities

New narratives

(Ahmed, 2017)

Manifesto

— Begin by recognising existing inequalities.

— To highlight, to make perceptible, a new order of ideas.

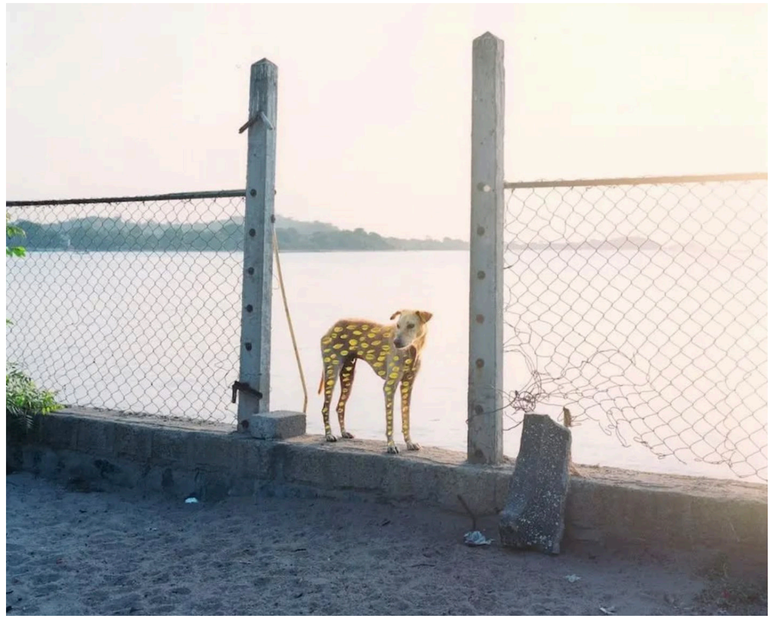
— Expose the violence inherent in a given order, as they.

— Accounting for what exists, as it concerns what we are facing.

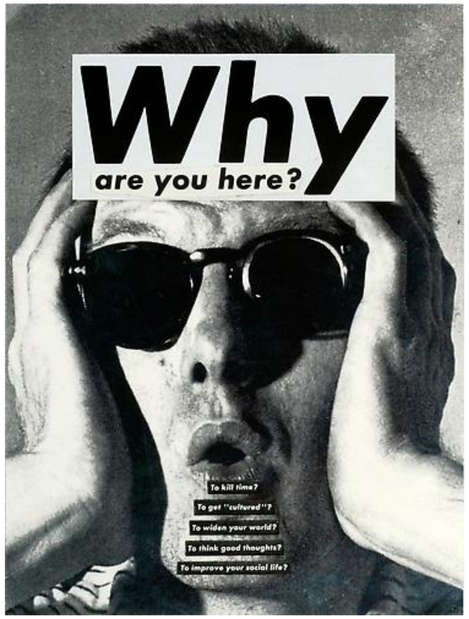
— Have the potential to be disruptive.

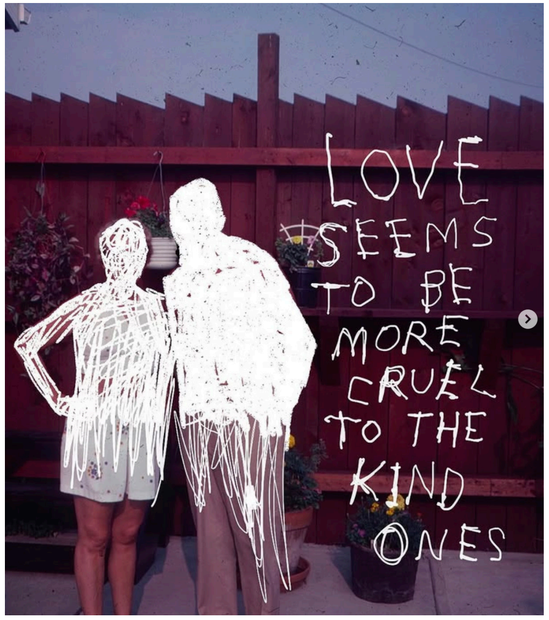
We invite you to take a moment of individual reflection
on your professional experiences as designers
— to uncover the values and attitudes that shape
the projects you engage with.

BERLIN
2021
08
04
LETTERPRESS
p98a
T-SHIRT I MADE
AS A GIFT FOR
ERIK SPIEKERMANN
PRINTED AT P98A IN
BERLIN IN 12 CICERO
PLAK CONDENSED BLACK
p98a



HOLA
¿VIAJAS POR PLACER O POR TRABAJO?
SOY JULIO, ¿TÚ?
JAVIRROYO


Why
are you here?
To kill time?
To get "cultured"?
To widen your world?
To think good thoughts?
To improve your social life?

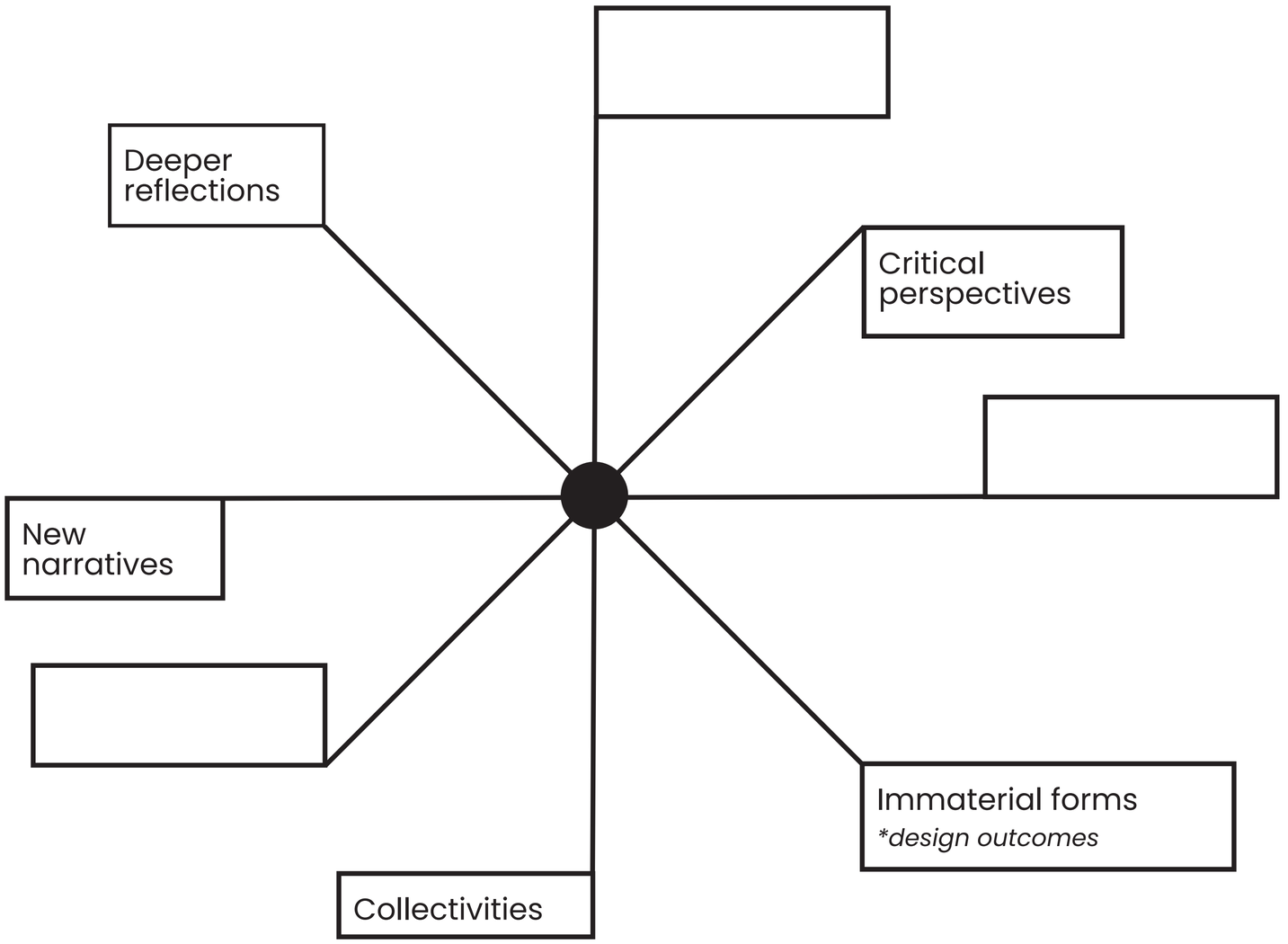

LOVE
SEEMS
TO BE
MORE
CRUEL
TO THE
KIND
ONES

Hack

— Hacking is a form of dissent.

— Dissent is not the same as hacking.

— A dissenting attitude does not arise exclusively from hacking.


Deeper reflections
Critical perspectives
New narratives
Immaterial forms
*design outcomes
Collectivities

ethical leadership
a new frontier for design
JUNE 3-7, 2025
Nantes, France
Cumulus Association
L'ÉCOLE DE DESIGN Nantes Atlantique

Co-designing for accessibility: design-led strategies to improve airplanes washroom for people with disabilities.

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ABSTRACT |

Background: In Canada, 27% of the population over fifteen lives with one or more incapacity (1). As a mean of transportation, airplane is one of the hardest to access for people with disabilities (PWD), with obstacle being either physical (e.g. washroom zone) and/or social (e.g the interaction with other passengers and flight crew) (2-7).
Objectives: To formulate recommendations for the federal agency Accessibility Standards Canada (with the aim of improving the legislation) through the development of inclusive design solutions of the washroom area for PWDs of 6 different airplanes models.
Methods: The methodology employed is an action research based on a co-design approach, comprising four stages: exploration, co-design, validation, and development (8). Stage 1 includes: a) A scoping review, to identify the current international accessibility practices; b) An evaluation of 6 aircraft cabin configurations in full-scale mock-ups using qualitative methods (e.g. walking interviews, co-design sessions) and quantitative tools.
Results: A multitude of practices and standards exist at the national and international levels; however, these practices seem to be far from inclusive. This is an ongoing project and the preliminary results of phase 1 (e.g. barriers and facilitators) will be presented at the Cumulus Nantes 2025 international congress.

KEYWORDS | DISABILITIES, AIRPLANES, INCLUSIVE DESIGN

Since the conclusion of the 20th century, questions of accessibility and inclusion have become increasingly prominent within the discipline of design. These issues are intertwined due to the fundamental understanding that a person's inclusion inherently encompasses access (Lebat 2019). Consequently, these concerns extend beyond the

mere physical accessibility of a space, location, or object, encompassing elements of a social nature (i.e. service and policy) These issues are particularly salient for persons with disabilities (PwDs) (Bianchin and Heylighen, 2018; Case, 2008; Guffey and Williamson, 2020; Moore et al, 2020; Ostroff, 2011). For PwDs, numerous challenges arise in various domains of daily life including transportation (Bianchin and Heylighen, 2018; Case, 2008; Guffey and Williamson, 2020; Moore et al, 2020; Ostroff, 2011). As such, this research focuses on the air travel experience of PwDs, and more specifically on their experience of the lavatories area.

1. The aircraft, one of the least accessible means of transportation

In comparison with October 2023 figures, the Canadian government with Statistics Canada (2024b) has documented a 7% increase in the number of passengers on board Canadian commercial flights for October 2024. However, for nearly a quarter of Canadians aged 15 and over who have reported one or more disabilities (Government of Canada, 2024a), air travel remains challenging to access despite its significance in the social participation of person with disabilities (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010). The airplane occupies a significant place in various contexts, including leisure, work, and family (Bauer, 2018; Darcy, 2012). In 2006, the United Nations (UN) *Convention on the Rights of Persons with* Disabilities acknowledged the right of PwDs to have equal access to and enjoyment of the same opportunities as others in all spheres of society.

However, a plethora of obstacles in aircraft for PwDs. These obstacles, resulting as much from human and organizational factors as well as the interaction with the aircraft's physical environment, represent a source of stress and anxiety for PwDs (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010). During flight, these obstacles manifest through various means, including, but not limited to, airline procedures, the lack of assistance from crew members, the malfunction of equipment utilized by passengers with disabilities, and the refusal of assistive equipment by staff (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010). In terms of the physical environment, obstacles manifest in various ways, including the configuration of the aircraft itself, such as aisle width, seat clearance, clearance around the lavatory area, and the different equipment found on board (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010).

One of the most notable challenges in aircraft pertains to the lavatory area, which has proven to be a significant source of complexity and concern for almost everyone (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010). The constrained dimensions of the space, the challenges associated with door operation, and the discomfort associated with sitting in such a confined area pose challenges for individuals of all abilities and are particularly problematic for PwDs (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010). For many PwDs, accessing lavatories from their seats presents a considerable challenge, often necessitating interaction with crew members, other passengers, and the aircraft's physical environment (i.e., circulation corridor and lavatory waiting area), thereby exacerbating stress in an already anxiety-inducing situation. (ref13). It can also means using the different assistive device present on board (such as the Washington chair), those being remarkably difficult and uncomfortable to operate for both the crew and the PwDs (ref). In the case of persons with a body mass index (BMI) that exceeds the threshold considered to be overweight or obese, toilet use can present challenges

analogous to those experienced by PwDs (Evans & al, 2024). These challenges may render lavatories use impossible and thus having a detrimental effect on personal hygiene and dignity (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010).

1.1 Objective

The objective of this study is to formulate evidence-based recommendations for the federal agency Accessibility Standards Canada (with the aim of improving the legislation). As such, this study also aims to understand the experience of PwDs when traveling by air, and to identify the barriers and facilitators present. More specifically, we aim to understand how the lavatories area in the airplane is lived by PwDs and what are the barriers and facilitators in this space. This will enable the development of accessibility solutions focused on PwDs needs. Additionally, it will demonstrate the relevance of an inclusive design approach in the elaboration of recommendations, based on the aforementioned solution, that will inform the development of norms and standards at the Canadian federal level. Furthermore, the largest airlines operating internationally tend to base their operations on the most restrictive legislative measures, suggesting the potential for this research project to have an impact beyond the Canadian context.

2. Methodology

In order to meet the objective, the present study uses a qualitative methodology, more specifically that of action research based on a co-design approach comprising four phases: 1) Exploration, 2) Co-design, 3) Validation and 4) Development (Morales et al, 2012). Phase 1, the exploration phase, is currently underway, and includes a) a scoping review to identify accessibility practices and standards in international and national aircraft, and b) the evaluation of different aircraft cabin configurations using qualitative methods (i.e. focus group and semi-structured interview). This research is supported by Accessibility Canada Standards.

2.1 Scoping review

For this stage of phase 1, the scoping review is done according to the established procedure by Arksey et O'Malley (2005). The first step, a preliminary review of the literature, done in order to select article, allowed for the identification of keywords and descriptors on which to base the scoping review. Subsequently, the various keyword and descriptors identified were discussed within the research team and with a librarian from Université Laval specializing in the various types of literature review in rehabilitation. The assistance of the latter ensured precision and rigor throughout the process. The subsequent implementation of the search strategy occurred in eight databases, including PubMed, Medline, CINALH - Academic Search Premier, CINALH - EBSCO, Web of Science, Embase, GeoBase, and Transport Ovid. This stage of the phase 1 is still ongoing, and preliminary results can be found in the result section of this article.

2.2 Aircraft evaluation

For the evaluation of different aircraft cabin configuration, data will be collected in six full-scale aircraft cabin replicas. These replicas will represent the most prevalent aircraft types used in Canadian aviation by size: wide-body (n=2), narrow-body (n=2), and regional jets (n=2). It is important to note that only a section of the airplanes will be reproduced, comprising several rows of seats in addition to one or more lavatories depending on the airplane model under evaluation. The research project is collaborating with one of the most prominent aeronautical industry manufacturers to construct these scale models. Participants will be recruited using convenience and snowball sampling techniques, and the study will include persons living with different disabilities (i.e. mobility,

visual, hearing, cognitive), obese persons, pregnant persons and persons with autism. The heterogeneity of the sample, in terms of both individuals and their respective experiences, engenders a more profound comprehension of diverse scenarios, a phenomenon that can be attributed to the capacity to establish meaningful comparisons (Pires, 1997). The data collection is scheduled to take place between February 2025 and June 2025.

2.3 Analysis

For the purpose of analysis, the utilization of the mixed thematic coding technique will be prioritized. This technique encompasses both deductive and inductive approaches. For the deductive component, the Disabilities Creation Process (DCP) will be employed, as it fosters a comprehensive understanding of disability by examining the diverse interactions that emerge between an individual and their environment (Fougeyrollas & al, 2019). The Nvivo software will be used for the thematic coding.

3. Preliminary results

Preliminary analysis of the results obtained in the scoping review reveals certain trends within the context of the study. Despite the implementation of numerous legislative measures in several countries (e.g., Canada, USA,) and the presence of certain facilitators, numerous barriers persist for transoceanic, national, and regional flights. As this research is ongoing, the following sections present the preliminary results of the scoping review, while the results of the aircraft evaluation will be presented at the Cumulus Nantes 2025 international conference.

3.1 Some legislative measures are in place

As previously indicated, numerous nations have instituted initiatives to address the obstacles encountered by PwDs. The preliminary analysis of the scoping review results in North America has revealed two recent documents that address these obstacles.
In Canada, in 2015, the federal government promulgated a legislative measure—a code of practice—firmly anchored in the aims of the United Nations Convention on the Rights of Persons with Disabilities. The document, titled *Aircraft Accessibility for Persons with Disabilities: Code of Practice for Fixed-Wing Aircraft with 30 or More Passenger Seats* encompasses a range of issues faced by PwDs in the context of aircraft, including but not limited to ramps, aisle widths, lighting components, and communication (Transport Canada, 2015).

In the United States, the Department of Transportation has required airlines to have at least one accessible lavatory in the single-aisle types of airplanes (narrow-body and regional jet), as outlined in a new piece of legislation dated from 2023 (United States Department of Transportation, 2023). However, the definition of "accessible lavatory" is left to the companies, as the documents do not provide any design criteria based on measurements. The document's scope is limited to persons with mobility disabilities, without addressing the needs of others PwDs. Despite these legislatives measures, it was possible to observed in the preliminary analysis of the scoping review that numerous obstacles persist at every stage of air travel, from planning to the actual flight (Budd & Ison, 2020; Gotti & al, 2024; Smal & Harris, 2012).

Furthermore, the international variability of definitions of what constitutes a "passenger with disabilities" can result in a wide range of experience for PwDs (Budd & Ison, 2020). This variability in disabilities definitions can result in the implementation of services, assistance, or procedures that differ from one flight to another, depending on the country in which the PWDs is traveling (Budd & Ison, 2020). Furthermore, the inconsistency in airline policies can result in discriminatory practices towards passengers deemed obese

that is similar to PwDs (Small & Harris, 2012).

3.2 Lavatories: the most problematic spaces in aircrafts

The various obstacles encountered by PwDs are subject to variation depending on each person's personal situation, experience, and the assistance equipment required. For instance, an individual requiring an assistance dog may encounter discrimination due to the airline procedures related to the animal's presence (Darcy, 2012). Similarly, a person requiring a manual wheelchair may face limitations imposed by aspects of the physical environment (Poria & al, 2010). However, preliminary results suggest that lavatory space, irrespective of aircraft type, represents an obstacle for many PwDs, regardless of disability.

Indeed, for children with disabilities, the use of the lavatories can be a significant source of discomfort and distress (Davies & Christie, 2017). A similar phenomenon is observed among parents or caregivers, who encounter a range of physical, emotional, and cognitive challenges (Davies & Christie, 2017). Among pregnant persons, access to and utilization of lavatories are among the most unsatisfactory equipment found on an aircraft (Chang, 2012). A similar situation is observed in persons utilizing assistive devices, such as wheelchairs, where the distance from seats and the necessity to transfer to the chair are frequently identified as problematic (Chang & Chen, 2012; Davies & Christie, 2017). Persons with a BMI equal to or above what is considered overweight or obese, which encompasses a broad spectrum of body types, are particularly vulnerable to adverse effects related to the use of lavatories (Evans & al, 2024; Poria & Beal, 2017). These effects can compromise not only personal hygiene but also the health of the person (Evans & al, 2024; Poria & Beal, 2017).

4. Discussion

As previously stated, the objective of this study is to understand the experiences of PwDs and to ascertain the barriers and facilitators that exist in the different types of aircraft. The subsequent step will be to develop accessible and inclusive solutions to address these barriers and facilitators. Consequently, the preliminary results of the exploratory review suggest several promising avenues for exploration within an inclusive design approach, particularly with regard to the development of norms and standards that can be implemented on a national scale. Indeed, the argument can be made that a transition from a performance-based standard to a design-based standard within the industry is imperative.

4.1 Design and civic involvement

The identification of discrepancies and disparities within the scope of legislative measures currently in place within the aviation sector offers a number of compelling avenues for reflection on the intentional and legislative levels. Indeed, the co-design approach adopted in this project is, in certain respects, grounded in the democratic principles of a design approach as articulated by DiSalvo (2022). Indeed, it is possible to believe, in light of the preliminary results obtained in the scoping review, that the use of this research approach favors the identification and articulation of the problematic, and therefore the development of legislative measures, through people's lived experience, where the designers then finds themselves in a role of translating needs and no longer in a position of authority through the act of design. Consequently, norms and standards are co-constructed with people, rather than being imposed on them.

4.2 The complexity of the lavatory space

The preliminary results from the scoping review phase of this study, more specifically the

challenges encountered in aircraft lavatories, align with the various dimensions (Environment, Lifestyle, and Personal Factors) of disability as defined in the DCP (Fougeyrollas & al., 2019). Addressing these issues through this model also offers interesting avenues of reflection for designers, particularly when it comes to the capability potential of objects and spaces. The capability approach, on which the concept of the capability object is based, offers interesting avenues for designers (Boylston, 2019). In the context of aircraft, where the physical environment is governed by legal and regulatory frameworks (see ICAO, for instance), the implementation of significant alterations is more likely to entail a design-oriented approach to services or the consideration of onboard equipment. Consequently, as discussed in the preceding section, it can be posited that the designer's role encompasses reinforcing the capabilities of PwDs by incorporating their experiences into the design process.

5. Conclusion

Among the various modes of transportation, air travel remains one of the most challenging for PwDs to access (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010). The spatial configuration, the presence of other passengers, and the interaction with crew members can contribute to an anxious and dehumanizing flight experience for PwDs (Bauer, 2018; Brouwer & al, 2019; Darcy, 2012; Evans & al, 2024; Engstrom & al, 2019; Poria & al, 2010). Despite legislative efforts in Canada and the U.S., significant barriers persist, affecting not only mobility but also dignity, comfort, and overall travel experience. The preliminary findings of this study highlight the urgent need for inclusive design approaches that extend beyond regulatory compliance to address the real-world experiences of PwDs. Accordingly, the findings of this research phase will be utilized to identify design criteria that will be employed to develop solutions in subsequent phases of the co-design approach. By integrating co-design methodologies and emphasizing civic involvement, this research aims to bridge the gap between policy and practice. The complexity of lavatory accessibility underscores the broader challenge of designing for diverse needs within confined environments. Consequently, the preliminary results also provide a basis for further consideration of the role of the designer in this context, notably in the development of norms, standard and public policy in the aviation sector.

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Community Engagement in Co-designing Design Education: insights from the "School Day" initiatives and the shifting curatorship role of institutions in educational transformation.

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ABSTRACT | Technological advances, fluctuating political dynamics, the unpredictability of global crises and, more recently, other contemporary overwhelming paradigms such as climate change, wars, and economic instability, have forced educators worldwide to rethink their teaching and have required students to adapt to novel ways of learning and things to learn. Institutions-wise, this shift has pushed an ongoing process of questioning the overall instructional framework in which higher education has traditionally existed. We argue that these recent experiences and challenges have been critical triggers for education stakeholders to move from contextual traditions to a period of dynamism, where reflection on undertaken actions may lead to an overall innovation of teaching and learning practices, valuing people's involvement, knowledge, competence, ethics, and relationships.

This contribution presents how the School of Design of Politecnico di Milano, a top-ranking institution in the design field, employed design methods to leverage

diverse competencies developed by different stakeholders to collaboratively re-design future design curricula and the university experience. The re-design process shifted from the traditional institutional "authorship" model, where leaders take the ownership for curricula design and strategic decisions, to an institutional "curatorship" model. In this model, the institution acts as a connected cultural intermediator, curating the design of the educational offer by creating opportunities to co-design educational innovation with various stakeholders. The authors present the case study of co-design activity named the 'School Day' initiative, a day dedicated to reflecting with teachers, administrative staff, and students on the educational offer and co-designing possible future directions together. The focus extends beyond institutional considerations, presenting a strategy to involve the broader educational ecosystem and fostering a continuous dialogue for participatory design. We detail the structural elements, activities, and tools utilised in co-design, collaboration, and designerly ways of thinking employed to rethink future trajectories of instructional design, considering the shared experience of the school's community.
Insights into the co-design process are provided by revealing its agenda through protocols, timelines, and photographic documentation. Data collected within the initiative are reported and analysed, considering subsequent developments and follow-up actions, such as the launch of a new academic program and planned activities with students in the upcoming academic year, among others. Finally, the contribution concludes with a discussion of the nuanced relationship between authorship and curatorship, reflecting on the results of the participatory activity and ongoing institutional efforts in promoting co-design approaches. The emphasis on community engagement and participatory design enhances the educational experience and empowers stakeholders to actively shape the future of education and its organisational change.
KEYWORDS | DESIGN EDUCATION, CO-DESIGN, CURATORSHIP, PARTICIPATORY ACTION RESEARCH, COMMUNITY ENGAGEMENT

1. Introduction

In recent years, global challenges such as technological advancements, political upheavals, and climate change have necessitated a re-evaluation of traditional educational models. As societies face increasing uncertainty and complexity, the field of design education is also undergoing significant transformation.
Historically, design education has followed a structured, top-down approach in which institutions held sole authority over curricula design and pedagogical frameworks. However, in response to these evolving challenges, institutions are now embracing participatory models that integrate co-creation and collaborative methodologies with various stakeholders. This paper explores the shifting role of curatorship as an institutional model for fostering community engagement and innovation in education. Specifically, it examines how curatorship—understood as a move from centralized authorship to distributed facilitation—allows institutions to act as cultural mediators, enabling a more inclusive and adaptive learning environment. By positioning institutions as curators rather than sole authors, this

model acknowledges the diverse expertise and perspectives of faculty, students, and external collaborators in shaping the educational landscape.

Using the *School Day* initiative as a case study, this paper investigates how participatory design methods can empower stakeholders to actively shape educational practices. *School Day* is an annual event organized to facilitate reflection and collaborative envisioning among educators, students, administrative staff, and external partners. The initiative serves as a co-design platform where key institutional actors engage in structured discussions and workshops to identify future directions for design education. The transition from authorship to curatorship is exemplified through this initiative, highlighting how design institutions can innovate their roles and practices by embedding participatory strategies into educational governance. The discussion will be structured as follows: first, we contextualize the rapid shifts in global and educational landscapes, emphasizing why design education must evolve to remain relevant. We then present the core research problem—namely, how institutions can transition from rigid top-down educational models to more dynamic, co-created approaches. This is followed by an exploration of the *School Day* initiative as an operational example of this transformation. The paper details the theoretical underpinnings of this shift, the methodology employed in the research, key findings from the case study, and broader implications for design education.

By presenting a concrete example of contextual innovation, this paper aims to expand knowledge on how design education institutions can redefine their roles and practices leveraging collective intelligence. It contributes to the ongoing discourse on participatory design in education, illustrating how institutions can cultivate spaces for shared decision-making and long-term strategic engagement within academic communities. Ultimately, the study seeks to offer insights into how co-design methodologies can serve as a tool for institutional transformation, fostering a more inclusive, reflexive, and responsive approach to educational development.

2. Background Knowledge

The contemporary educational landscape is undergoing profound transformations driven by rapid socio-technical shifts, technological advancements, and evolving societal needs. Compared to other disciplines, design education is particularly sensitive to these changes due to its inherently dynamic and practice-oriented nature (Rampino, 2022). Historically, design as a discipline has continuously evolved in response to external influences, integrating emerging methodologies, tools, and technologies. Today, these influences manifest in the pressing need for educational models that take adventage of diffuse knowledge, are motivating and engaging for both teachers and students, are more adaptable, participatory, and reflective of complex realities.

2.1 Instructional design innovation in a rapidly evolving context

Given the evolving nature of design practices, design education must not only respond to change but also anticipate and shape it. Curricula must be designed with a proactive approach, fostering an environment where students and educators collaboratively explore, experiment, and redefine pedagogical frameworks. This requires institutions to shift from static educational models to dynamic, co-designed learning ecosystems.

Research on instructional change provides a valuable lens to understand how innovation can be embedded in teaching practices. Castoldi (2021) identifies three distinct relationships between research and educational improvement: research on improvements, which provides external feedback without directly influencing teaching practices; research for improvements, where research acts as a preliminary step to trigger transformation; and research as improvement, where research is embedded within the change process itself, making research and innovation inseparable. This framework is particularly relevant in the context of design education, where iterative learning and reflexivity play a crucial role in shaping pedagogical practices.
Furthermore, the situatedness of curriculum innovation (Mattioli et al., 2023) highlights the importance of understanding how global socio-technical shifts are being tackled within specific educational contexts. Curriculum innovation cannot be seen as a one-size-fits-all approach but must instead be deeply contextualized, integrating both global trends and local educational needs. This perspective aligns with emerging discussions on the necessity of combining top-down strategic frameworks with bottom-up participatory approaches to educational reform.

This paper argues that a significant step in this direction can be the transition from an authorship model to a curatorship model in educational institutions. Traditionally, design education has been shaped by a centralized authorship approach, where a select group of institutional leaders define curricula and pedagogical strategies. However, contemporary challenges necessitate a more inclusive and systemic approach, positioning institutions as curators rather than sole authors of knowledge. This curatorship model acknowledges the complexity of educational transformation and recognizes the value of diverse stakeholder engagement in shaping curricula (Ashton & Couzins, 2015; Ruitenberg, 2015). In this model, institutions act as facilitators of collective intelligence, integrating contributions from faculty, students, industry partners, and administrative staff to co-create learning experiences that are relevant, adaptive, and future-oriented.

This paradigm shift reflects a broader institutional transformation that seeks to embed community engagement and participatory design into curriculum development. The School Day initiative serves as an example of how this transformation is operationalized, illustrating how participatory processes can lead to more responsive and contextually relevant educational strategies. By moving from a prescriptive model of education to a facilitative one, institutions can create more resilient and innovative learning environments that reflect the complexities of contemporary design practice. Therefore, instructional design innovation in the context of design education requires a systemic shift that

embraces participatory methodologies, recognizes the situatedness of curriculum development, and redefines the role of educational institutions as curators of learning rather than unilateral decision-makers. This approach not only enhances the adaptability of design education but also ensures that it remains relevant and impactful in an ever-changing world.

2.2 Reshaping the Institutional School Role in a Situated Context: from Author to Curator of the Curricula Innovation

For decades, the School of Design of Politecnico di Milano—like many other higher education institutions—has operated under a rather conventional governance model of institutional authorship, where curricula, pedagogical frameworks, and educational policies were prevalently defined through top-down decision-making processes. While programme coordinators and course teachers had, obviously, a vaste degree of freedom in defining contents and subjects of their activities, the overall strategy of the School was set by the academic directors, and shared throught the academic institutional boards and governance mchanisms.
This approach, while providing stability and coherence, often resulted in rigid structures that left little room for adaptation, innovation, or the integration of diverse perspectives. As the socio-technical landscape of design continues to evolve, educational institutions are increasingly recognizing the limitations of a top-down model in addressing contemporary challenges.
A paradigm shift towards institutional curatorship is emerging as a response to these challenges, positioning institutions not as sole authors but as facilitators of educational co-design. This shift acknowledges the need for distributed agency, fostering dialogue among multiple stakeholders—including faculty, students, industry representatives, and administrative staff—to collectively shape educational trajectories. In this model, institutions act as intermediaries, cultivating ecosystems where knowledge is co-created, curricula are continuously refined, and emerging trends are critically assessed (Ashton & Couzins, 2015; Ruitenberg, 2015). The distinction between authorship and curatorship in educational governance reflects broader transformations in leadership and institutional roles. Traditional authorial models of curriculum planning tend to centralize expertise, reinforcing a structured and controlled learning pathway. In contrast, the curatorial model embraces participatory design, enabling the integration of bottom-up contributions into strategic planning and curricular development (Oak & Lloyd, 2015). This shift is not about relinquishing institutional responsibility but rather about repositioning it: from a prescriptive approach to an adaptive and responsive one. This transformation aligns with the designerly ways of thinking proposed by Cross (2007, 2011), which emphasize iterative problem-solving, stakeholder engagement, and reflective practice. By embedding co-design approaches (Sanders & Stappers, 2008; Iversen et al., 2012), institutions can navigate complexity while ensuring that design education remains relevant, inclusive, and attuned to real-world needs.

One of the key assumptions underpinning this transition is the recognition of co-design as a means for researching future contextual scenarios in education. The participatory nature of co-design allows institutions to explore, test, and

refine educational models through engagement with those directly involved in learning and teaching. This raises critical research questions:

- *How can community engagement and co-design practices reshape design education to move beyond traditional models?*
- *What is the role of institutions in curating and enabling this transformation?*
- *How might we transition from authorship to curatorship within complex educational communities to foster consensus, generate ideas, and shape strategic directions?*

By shifting towards a situated and iterative approach to curriculum innovation, institutions can move away from static educational frameworks and instead adopt an adaptive learning ecosystem—one that remains responsive to emerging technologies, pedagogical methods, and societal needs.
The transition from authorship to curatorship also calls for a reconsideration of leadership styles and institutional roles. Curatorship implies an active engagement in knowledge mediation, requiring institutions to listen, interpret, and facilitate rather than dictate (Meroni et al 2018). This entails cultivating an institutional culture of reflexivity, where decision-making processes are informed by continuous dialogue and evaluation.

This transformation is evident in initiatives such as School Day, which exemplifies how co-design methodologies can be leveraged to inform institutional strategies. By providing a structured yet open-ended platform for discussing educational challenges and opportunities, such initiatives reinforce the importance of collective intelligence and shared ownership in shaping the future of design education.

3. Methodology

This study adopts a Participatory Action Research (PAR) approach, leveraging the School Day initiative as both a research intervention and a site of inquiry. As a method that bridges research and practice (Baum et al., 2006), PAR actively involves stakeholders in co-designing solutions, reflecting on shared experiences, and iteratively refining actions based on emerging insights. In this context, the research focuses on the School Day 2022 edition, the first organized after the COVID-19 pandemic, a moment in which there was a heightened institutional need for reflection and innovation. By analyzing the outcomes of this initiative three years later, this study explores the long-term impact of participatory co-design approaches on curriculum development and institutional strategy.

3.1 Participatory Action Research as the guiding methodology

The choice of applying Participatory Action Research (PAR) lies in the fact that it is collaborative, iterative, and contextually embedded, making it particularly suited for studying curricular transformation through co-design. It aligns with the shift from institutional authorship to curatorship, as it actively engages educators, students, and staff in shaping design education rather than positioning them as

passive recipients of predefined policies. The School Day initiative serves as both a research intervention and a means for institutional transformation. This participatory setting enabled an inclusive process of educational co-design, where faculty, students, and administrative staff collectively explored, debated, and proposed innovations for the design curriculum. As a structured moment of reflection and future-oriented thinking, the initiative functioned as a living lab, facilitating the generation, discussion, and evaluation of ideas in real time.

The School Day 2022 edition was particularly significant as it marked the first opportunity for institutional dialogue and reconfiguration after the disruptions of the pandemic. This edition provided a unique research opportunity to analyze how co-design methodologies could be implemented within governance structures and how they could inform strategic decision-making. Through PAR and co-design, the methodology was structured around three key principles:

- **Participatory Engagement:** Ensuring that faculty, students, and administrative staff were active participants in shaping the future of design education.
- **Iterative Reflection and Action:** Using feedback loops to refine and iterate proposals, ensuring alignment with institutional priorities and community needs.
- **Long-Term Impact and Institutional Integration:** Tracing the follow-up actions that emerged from the School Day discussions to assess their influence on the university's curricular and pedagogical strategies.

3.2 Data collection

To capture the depth and complexity of the co-design process, a multi-method approach was employed, ensuring a comprehensive understanding of both the participatory experience and its institutional follow-up. The data collection methods included:

- **Documentation of Co-Design Outputs:**
  - Completed workshop templates, brainstorming materials, and session summaries were collected to trace the discussions and conceptual pathways that emerged.
  - Annotated session agendas and co-design artifacts (e.g., maps, post-its, synthesis boards) provided tangible records of stakeholder contributions.
- **Plenary Session Transcripts and Observational Notes:**
  - The final plenary session, where each thematic group presented and discussed its findings, was recorded and transcribed.
  - Observational notes captured group dynamics, discussion patterns, and key points of debate among participants.
- **Photographic and Video Documentation:**
  - Images and video recordings of the co-design sessions documented interactions, spatial configurations, and engagement levels.
- **Institutional Follow-Up Data (2022-2025):**

- Internal reports and meeting minutes from subsequent faculty discussions and institutional planning were analyzed to trace the impact of the School Day 2022 outcomes.
- Interviews with key stakeholders (e.g., program coordinators, faculty members) were conducted to assess how the proposals from the initiative influenced curricula, teaching models, and governance practices over time.

3.3 Data analysis

By integrating real-time data from the 2022 event with longitudinal follow-up evidence, this methodology ensures that the analysis captures not only the participatory experience but also its lasting effects on institutional decision-making. A thematic and comparative analysis was conducted to uncover the key themes and insights from the collected data. The analytical process involved the following steps:

1. **Thematic Coding**:
   - The collected artefacts and transcripts were coded to identify recurring themes, patterns, and insights.
   - Key themes included innovation in teaching formats, inclusivity in educational practices, and the integration of emerging societal needs into curriculum design.
2. **Comparative Analysis**:
   - Outputs from different thematic tables were compared to identify areas of convergence and divergence, offering insights into collective priorities and unique perspectives.
3. **Traceability of Impact**:
   - The follow-up actions and long-term impacts of the proposals were traced over a three-year period. This analysis highlighted the effectiveness of the co-design process in influencing institutional strategies and demonstrated how participant voices were translated into action.

By integrating thematic and textual analysis, the study provided a nuanced understanding of the School Day initiative's outcomes and their broader implications for design education.

4. Case Study: The School Day 2022

The School Day 2022 has been the first structured attempt to experiment with a novel governance model for the School of Design reflecting a new leadership style, emphasizing collaborative governance and participatory decision-making (Fig. 1).

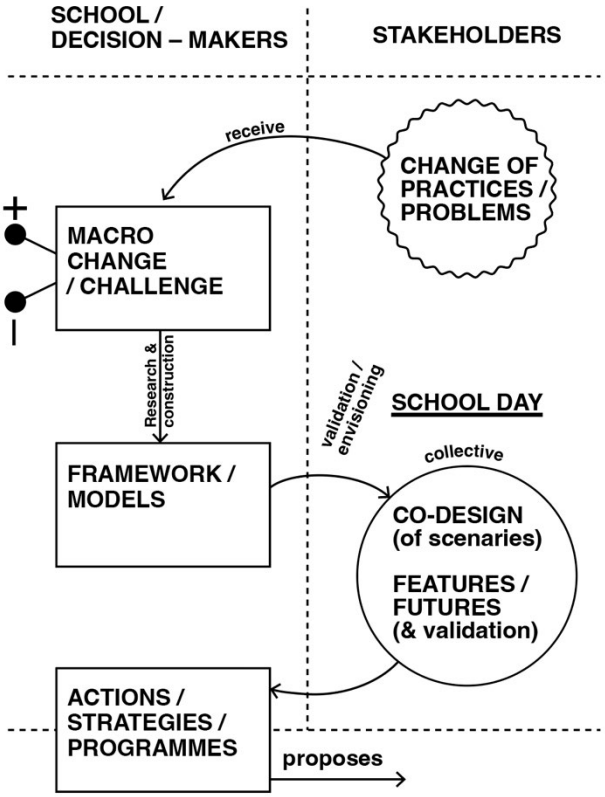

Figure 1. Diagram showing the workflow and involvement of different stakeholders that led to the establishment of the School Day.

Rather than imposing top-down reforms, the institution engages in a dialogical and iterative process that unfolds through a structured methodology. Its purpose is to envision the evolution of the School together with its community, co-define the next steps to take and create engagement around them. The model at the basis of this initiative follows these key phases:

1. **Finding a theme**: Identifying what is relevant, urgent, and a priority for the school's strategy. The process starts by recognizing the most pressing challenges and transformation needs, whether they emerge from within the academy or from its broader ecosystem of stakeholders.
2. **Mobilizing a mixed group of co-organizers:** Engaging faculty, staff, and students who are directly concerned with the theme, have relevant expertise, and are interested in contributing. This ensures that discussions are informed, inclusive, and capable of addressing different perspectives.
3. **Finding experts:** Involving both internal university experts and external contributors who can provide valuable knowledge and stimuli, fostering interdisciplinary dialogue and expanding the horizon of the discussion.
4. **Designing the co-design workshop and training facilitators**: Structuring the event to enable meaningful and generative discussions. This phase focuses on designing the co-design methodologies, ensuring that they encourage participants to think beyond conventional approaches and imagine innovative solutions. Dedicated training for facilitators ensures smooth moderation of conversations.
5. **Gathering the whole school's community for one day:** Creating a space for collective participation, where stakeholders work together, share meals, and engage in cultural initiatives in a convivial setting. The event fosters an

atmosphere of collaboration and informal exchange, reinforcing social cohesion and institutional belonging.

The School Day initiative exemplifies the application of co-design principles within a higher education setting. It serves as an experimental space where facilitated workshops, brainstorming sessions, and reflective exercises capture the complexities of contemporary educational challenges. The tools employed—ranging from participatory mapping to visual storytelling—enable active engagement from all participants, fostering a sense of ownership over the outcomes. Beyond serving as a forum for dialogue, the initiative has demonstrated its potential to drive tangible institutional change: the various editions have influenced curricular innovation, contributed to new academic programs, and strengthened relationships within the educational ecosystem. By embedding participatory design methodologies into the institution's governance model, School Day highlights the transformative potential of curatorial leadership in education, positioning the institution as a facilitator of collective intelligence rather than a prescriptive authority.

4.1 Goals, participants, and structure

The School Day is annualy organised at the end of July, coinciding with the conclusion of the academic year. This strategic timing ensures maximum participation from a diverse range of stakeholders, including academic staff, students, professional, administrative and technical staff and external collaborators. Doing so, it embraces a horizontal, inclusive approach, inviting diverse voices to contribute to the evolution of teaching and learning practices. It runs for the whole day, from 9 a.m. to 5 p.m.

Figure 2. Photo taken on School Day 2022, during the workshop and thematic table activity.

Each School Day begins with a plenary session, which includes:

- **State of the Art and Achievements:** Sharing results and key milestones from the past academic year.
- **Expert Talks:** Featuring external speakers who provide fresh perspectives on education, design, and innovation.
- **Workshops:** Facilitated sessions focusing on specific themes, structured into thematic tables for in-depth discussions and collaborative ideation.
- **Plenary:** Final moment of sharing of all thematic tables by their facilitators.

The workshops form the central component of the day, lasting approximately four hours, interspersed with breaks for lunch and refreshments. These sessions culminate in a plenary, where participants present and discuss their findings, ensuring a collective synthesis of ideas and insights.

Figure 3. Detail photo of one of the thematic tables during the School Day 2022 workshop.

For this paper, we focus specifically on the School Day 2022 as it offers a unique vantage point. The 2022 edition provides the opportunity to analyse its follow-up impacts over three subsequent years, a timeframe that allows us to evaluate the sustained influence of the initiatives proposed during the event. Subsequent editions, while valuable, do not yet offer a comparable longitudinal perspective. The theme for the School Day 2022, **"Innovating the Formats and Contents of Design Didactics at the School of Design,"** sought to address urgent questions about how design education could evolve to remain relevant in a rapidly changing world. The workshops were divided into two macro groups:

1. **Future Didactics**: Six tables focused on reimagining teaching methods, tools, and environments to align with contemporary needs.
2. **Future Curricula**: Six tables dedicated to envisioning innovative curriculum structures and pedagogical strategies.

The event attracted **140 participants**, representing diverse perspectives:

Table 1. Number of participants in the School Day 2022

Participants	N.

Teachers	Structured teachers, researchers, and contract teachers (a portion of these participants were professionals from outside the academic sphere).	121
Students	Student representatives and doctoral candidates.	7
Administrative & Technical Staff	Technicians, administrators, laboratory managers, librarians, and other key personnel involved in academic and operational functions.	12

4.2 Co-design activities and tools

The process was structured into thematic workshops centered around two main topics: **"Future Didactics"** and **"Future Curricula"**. Each topic was further divided into smaller tables, each assigned specific goals and equipped with tailored tools and protocols to guide the discussions.

Figure 4. Photo of one of the thematic tables during the School Day 2022 workshop.

The workshops were based on clear agendas and narratives designed to engage participants creatively while maintaining focus on the objectives. The key goals were to:

- Support collective awareness of the directions being explored by the School of Design.
- Facilitate the creation of implementation scenarios for innovative educational formats and content.

- Encourage the exchange of experiences among participants to enrich the design process.

The activities relied on a combination of structured methodologies and creative exercises to achieve these outcomes.

- **The "Future Didactics" Workshop**

Figure 5. Templates created ad hoc and used for the brainstorming session and discussion within the thematic tables on Future Didactics at School Day 2022.

- **Narrative Approach**: Participants were welcomed into "The Kitchen of Design Education," where they were metaphorically tasked with creating "recipes" for new formats of design education. This playful metaphor provided a creative entry point into discussions.
- **Activity Flow**:
  - Icebreaking and introductions to establish a collaborative atmosphere.
  - Reviewing foundational materials, including "ingredient cards" (Fig. 5) describing key components of teaching methodologies (e.g., flexibility, interactivity, inclusivity).
  - Supporting participants to draft specific "recipes" for teaching methods.

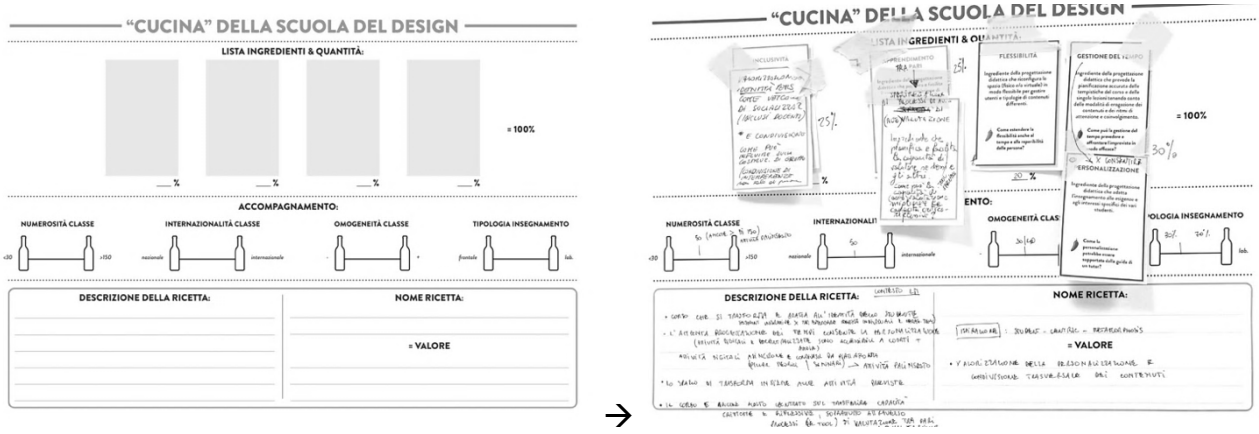

Figure 6. Material and a scan of a completed template at the end of the workshop for the thematic tables on Future Didactics at School Day 2022.

- **Outcome**: Each table produced one or two well-defined proposals for implementing future didactic approaches. These included specifying key "ingredients," their proportional use, and the added value of their combination (Fig 6).

- **The "Future Curricula" Workshop**

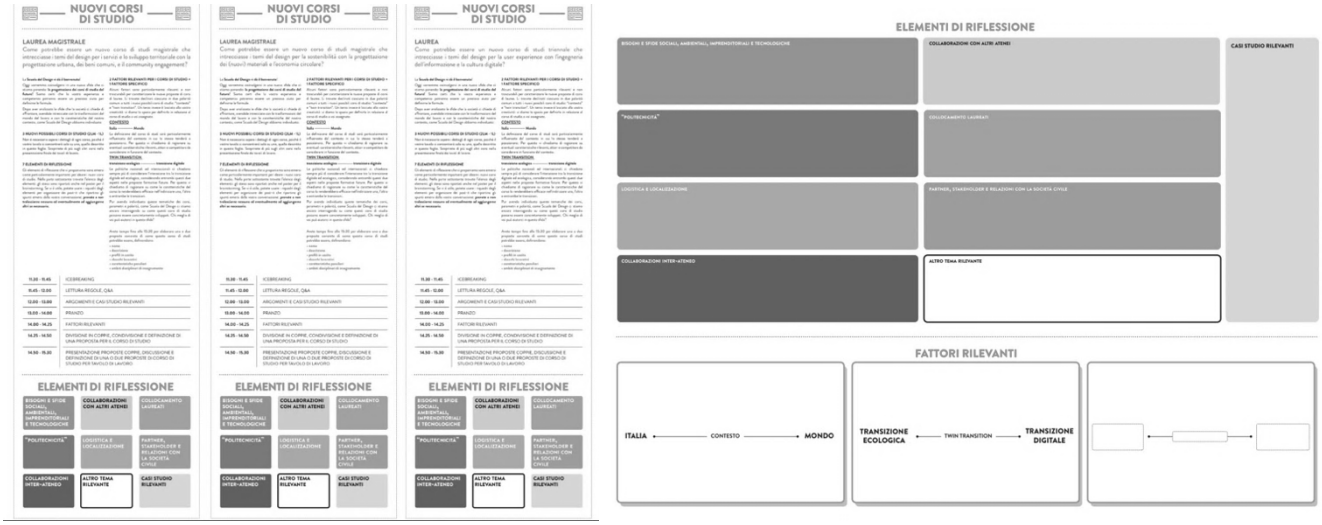

Figure 7. Templates created ad hoc and used for the brainstorming session and discussion within the thematic tables on Future Curricula at School Day 2022.

- **Guided Brainstorming**: The activity started with an open discussion to gather ideas about emerging educational trends and societal needs.
- **Key Tools**:
  - **Poster Brainstorming Sheets**: Facilitators used these to structure the initial discussions, focusing on key themes like ecological and digital transitions (Fig 7).
  - **Course Design Templates**: Each group completed templates outlining the proposed course's name, description, outcomes, and potential career paths (Fig 8).

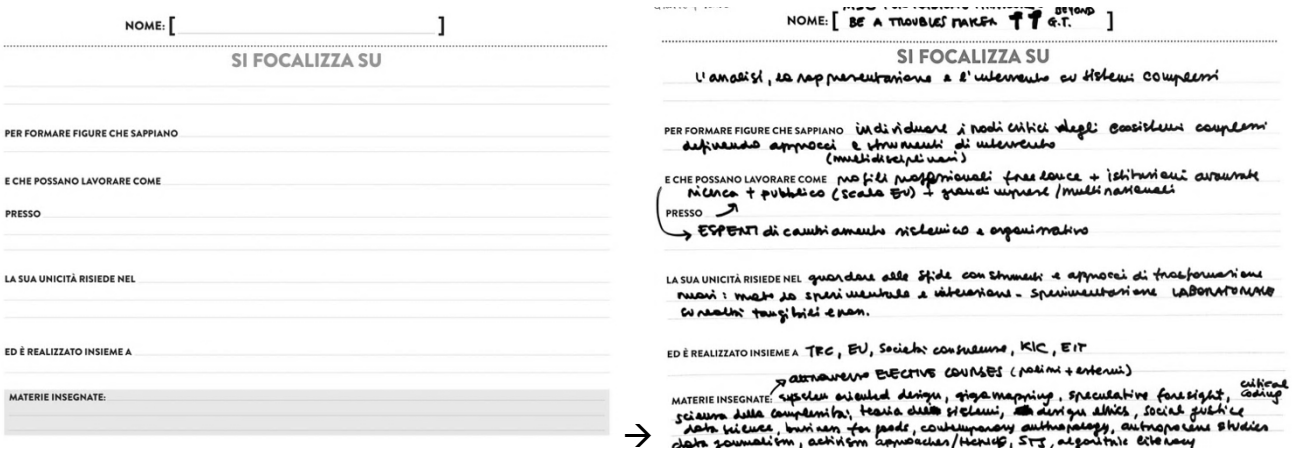

Figure 8. Course Design Template and its scan completed at the end of the workshop for the thematic tables on Future Curricula at School Day 2022.

- **Outcome**: The groups collaboratively finalised one or two course proposals per table, aligning them with the identified educational priorities.

N. Results & Discussion

The findings from the School Day 2022 initiative highlight both the opportunities and challenges of transitioning from an authorship to a curatorship model in design education. By engaging a diverse group of stakeholders—including faculty, students, and administrative staff—this co-design process facilitated a shared reflection on the evolution of didactic methodologies and curricular structures. The results of the initiative reveal key insights into three primary areas: 1) innovative future didactic models, 2) future-oriented curricula, and 3) institutional transformation through participatory processes.

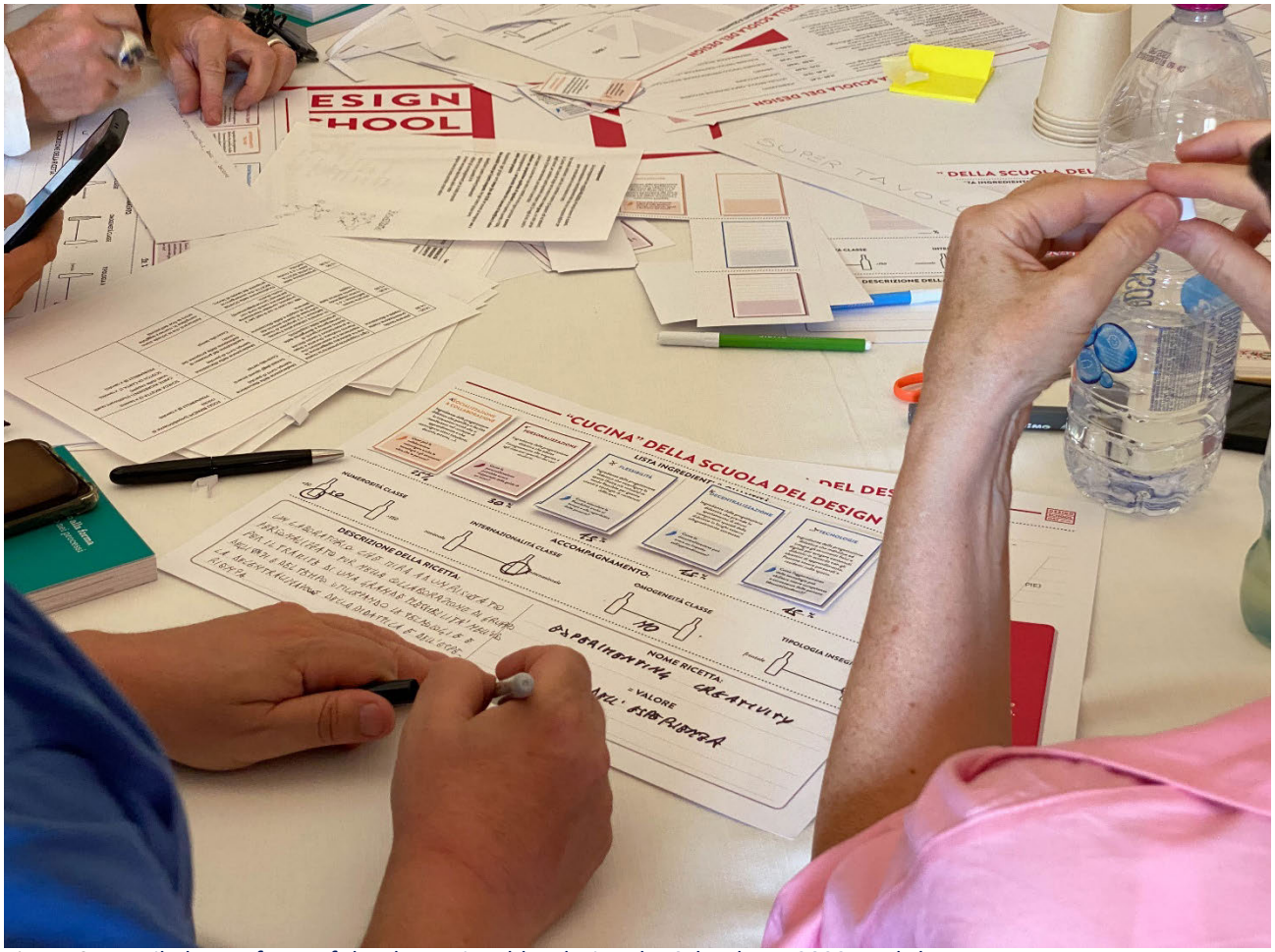

Figure 9. Detail photo of one of the thematic tables during the School Day 2022 workshop.

5.1 Key insights from the "Future Didactics" plenary

The Future Didactics discussions underscored the importance of developing adaptive, inclusive, and experiential learning models that respond to the rapidly changing landscape of higher education (Table 2).

Table 2. Insights emerged from the Future Didactics tables.

Future Didactics	
Key Models/Proposals	**Key Features**
Presence-Based Models (Team 1)	- Small, diverse, and international classrooms. - Peer learning and interdisciplinary collaboration. - Flexible, technology-enhanced labs. - External professional contributions.
High Presence Hybrid Models (Team 2)	- "Student-Centric Metamorphosis": 70% in-person, 30% online. - Personalised learning via shared digital platforms. - "Extended Learning": Decentralised spaces (e.g., museums) for autonomous group work.
Low Presence Models (Team 3)	- “Caponata Blended": Online theory, in-person collaborative sessions. - "Hyper-Cocktail": Decentralised, real-world project-focused learning.
Coordinated Flexibility Models (Team 4)	- "Frutta di Stagione" (Seasonal fruit): Modular, adaptable teaching across academic years. - "Hippocampus": Combines on-campus and off-campus learning using urban resources.
Fully Online Models (Team 5)	- International accessibility and "knowledge addiction" through engaging formats (e.g., podcasts). - On-demand foundational content with collaborative, peer-to-peer learning.
Always Hybrid Models (Team 6)	- "Controlled Hybrid": Precise planning of in-person and online elements. - Personalised, on-demand learning supported by adaptable spaces.

Across the various thematic tables, a common theme emerged: the need for greater flexibility in teaching methods to accommodate different learning preferences and contexts. Presence-based models emphasized the value of small, interdisciplinary, and international classrooms that encourage peer learning, hands-on experiences, and collaboration in technology-enhanced environments. These models highlighted the significance of external professional contributions, reinforcing the idea that learning must extend beyond the academic sphere and into real-world applications. The hybrid models proposed by different teams explored a structured blend of in-person and online learning, with varying degrees of physical engagement. Proposals such as “Student-Centric Metamorphosis” suggested a 70% in-person and 30% online structure, allowing for personalized learning through digital platforms while maintaining strong social and collaborative elements in physical spaces. Similarly, models like “Controlled Hybrid” introduced precise planning of online and in-person components, enabling students to engage in adaptable, self-paced learning while ensuring structured face-to-face interactions. On the other hand, low-

presence and decentralized models pushed the boundaries of distributed learning environments, envisioning education as something that happens beyond the traditional campus. Concepts such as "Caponata Blended" and "Frutta di Stagione" suggested modular, adaptable teaching strategies that leverage urban spaces, museums, and other cultural institutions as sites for decentralized education. Fully online proposals introduced a different perspective, focusing on how digital learning can be restructured to maintain engagement and foster deep learning. A notable example was the "Knowledge Addiction" model, which proposed engaging, on-demand formats such as podcasts and interactive media to create a continuous, self-directed learning experience that extends beyond structured university programs. These findings provide a direct response to our first research question on how participatory and co-design methods can reshape educational models. They illustrate a concrete shift from rigid, top-down approaches to more dynamic, student-centered, and technologically integrated formats. This transformation is not only evident in the new didactic proposals but also in the ways the community was engaged in defining them.

5.2 Key insights from the "Future Curricula" plenary

The Future Curricula plenary discussions revealed how design education must evolve to address contemporary societal, technological, and environmental transformations (Table 3).

Table 3. Insights emerged from the Future Curricula tables.

Future Curricula	
Key Models/Proposals	**Key Ideas**
Digital (Teams 1)	- **Sustainable Digital Design**: Focused on creating ethical professionals capable of designing sustainable digital systems and managing their environmental and social impacts. - **Digital and Interactive Ecosystems**: Trains hybrid professionals integrating technology, design, and social sciences for human-centered digital systems.
Digital (Team 2)	- **Design for Technology-Based Innovation**: A hands-on bachelor program bridging design, coding, and engineering for technological creativity and experimentation.
City (Team 3)	- **FLU (Future, Places, Humanity)**: Blends urban design and community engagement to train strategic and ethical system makers. - **Smart Spaces and Communities Design**: Focuses on systemic design for inclusive, sustainable urban environments leveraging advanced technologies.
City (Team 4)	- **Design for Ecosystems: Communities, Places, and Policies**: Trains designers to mediate complex ecosystems and develop strategic solutions for urban sustainability.

	- **MSC for Radical Thinkers**: Prepares systemic changemakers with tools for analyzing and intervening in complex systems at local and global scales.
Materials (Team 5)	- **Digital Ecological Sustainable Materials**: Focuses on interdisciplinary approaches to sustainable material science and production processes. - **Design for Circular Materiality**: Emphasizes circular economy principles and sustainability in material design. - **Material Sustainability Systems**: Targets system-level innovations linking materials, production, and sustainability.
Materials (Team 6)	- **Materials Design for Sustainable Transition**: Prepares designers to integrate sustainability and material innovation, emphasizing hands-on learning and adaptability to technological and regulatory changes.

Across the thematic tables, participants co-designed new interdisciplinary and systemic educational frameworks, emphasizing the integration of technology, urban innovation, and sustainable material research. The emerging proposals reflected a growing awareness that future curricula must transcend disciplinary boundaries and equip students with holistic, systems-thinking approaches.
One of the dominant themes was the intersection of design and digital innovation, with proposals highlighting the need to integrate sustainability and ethics into digital systems. The Sustainable Digital Design program was conceived as a way to train ethically responsible digital practitioners, focusing on the environmental and social implications of digital infrastructures. Similarly, the Digital & Interactive Ecosystems curriculum aimed to create hybrid professionals who merge design, coding, and social sciences, ensuring that technology remains human-centered and socially responsive. These curricula proposed a stronger focus on AI, data ethics, and systemic digital transformation, reflecting the evolving demands of both industry and society.
Another key area of discussion centered around urban design and systemic thinking, emphasizing the role of designers in shaping sustainable and inclusive cities. The FLU (Future, Places, Humanity) curriculum blended urban planning, community engagement, and systemic innovation, preparing students to become strategic designers capable of addressing complex urban challenges. Meanwhile, the Smart Spaces & Communities Design proposal sought to integrate advanced technologies into urban systems, fostering the creation of digitally augmented, inclusive, and participatory public spaces. Expanding this systemic approach, the Design for Ecosystems program positioned designers as mediators of complex urban networks, helping to shape policy and strategic governance frameworks.
Material sustainability emerged as another pressing concern, with several proposals focusing on circular economy principles and the responsible development of new materials. The Digital Ecological Sustainable Materials curriculum emphasized the interdisciplinary nature of sustainable material science, production processes, and digital fabrication. Similarly, the Design for Circular Materiality program advocated for system-level innovation, encouraging

designers to rethink material flows and ecological impacts. The Materials Design for Sustainable Transition course introduced hands-on, experimental approaches to material research, preparing students for rapidly changing regulatory and technological landscapes.
These discussions collectively reflected a growing recognition that design education must move beyond isolated disciplines and instead embrace a systemic, transdisciplinary approach. By incorporating technology, urban resilience, and material innovation into design curricula, these proposals aligned with the broader goal of equipping future designers with the tools to navigate complex global challenges.

5.3 Summary of Key Findings and Implications

The findings from the School Day 2022, besides the specific outputs related to the topic of "Innovating the Formats and Contents of Design Didactics", reveal how co-design practices can reshape design education through: 1) inclusive and adaptive pedagogies (RQ1), 2) institutional transformation from authorship to curatorship (RQ2), and 3) the activation of shared responsibility within educational communities (RQ3).
The initiative also offers broader implications: it contributes to theoretical discussions on participatory and systemic design in education by supporting a shift from hierarchical to distributed leadership and aligns with the emerging role of educational institutions as relational infrastrucutres; it informs policy by proposing a model for strategic educational planning enabling consensus-building and co-owned visioning; and it supports practice by offering a replicable framework for educational innovation through structured dialogue and community engagement.

6. Conclusions & Future Directions

The School Day initiative has demonstrated how participatory processes can serve as a catalyst for educational transformation, reinforcing the shift from authorship to curatorship within academic institutions. By fostering collaboration, inclusivity, and systemic engagement, this initiative has positioned the School of Design as a facilitator of co-created knowledge, rather than a prescriptive authority. Through structured participation sessions, the initiative enabled stakeholders—including faculty, students, and administrative staff—to collectively reflect on educational challenges and develop strategic proposals for curriculum innovation. This engagement can be seen as beneficial non only for the creation of knowledge, but aso as precondition for the motivated participation in the transformation of the institution through the implementation of the co-designed actions.

Beyond the specific results achieved, one of the most valuable and enduring aspects of the School Day initiative is the way it has evolved into a recurring institutional practice. Each year, the School of Design convenes this important annual appointment, where emerging themes from previous editions become starting points for new discussions, reflections, and co-design processes.

This iterative approach has created a dynamic mechanism for continuous adaptation and institutional learning, ensuring that the voices of faculty, students, and staff remain integral to shaping educational strategies. This ongoing cycle of participatory dialogue and knowledge-building reinforces the School Day's role as more than just a singular event, but rather as a systemic tool for institutional evolution. It has become a structured opportunity to realign academic priorities, critically reassess past outcomes, and formulate new trajectories based on the collective intelligence of the School's community. While the most tangible and concrete results—such as curriculum reforms and new academic programs—are illustrated in Section 6.1, the broader impact of the initiative lies in its ability to sustain an open, evolving conversation about the future of design education.

6.1 Follow-up actions

One of the most significant outcomes of the School Day initiative has been its long-term impact on institutional decision-making. Among the various results is the launch of the new undergraduate program in Interaction Design (offered in English), which was directly influenced by discussions that emerged from the School Day 2022 edition. This new program represents a strategic move towards internationalization and interdisciplinary learning, reinforcing the School's commitment to expanding its global reach and adapting to evolving industry needs.

Beyond curriculum development, the School Day discussions also contributed to spatial and infrastructural transformations within the university. The creation of a new open design lab on Level -1 of Building B2 exemplifies how participatory methodologies can extend beyond educational formats to shape learning environments themselves. This dedicated space was conceived as a collaborative hub for interdisciplinary experimentation, fostering hands-on learning and participatory design research. Such infrastructural developments reflect a broader institutional shift towards flexible, student-centered learning spaces that align with the principles of systemic and relational design.

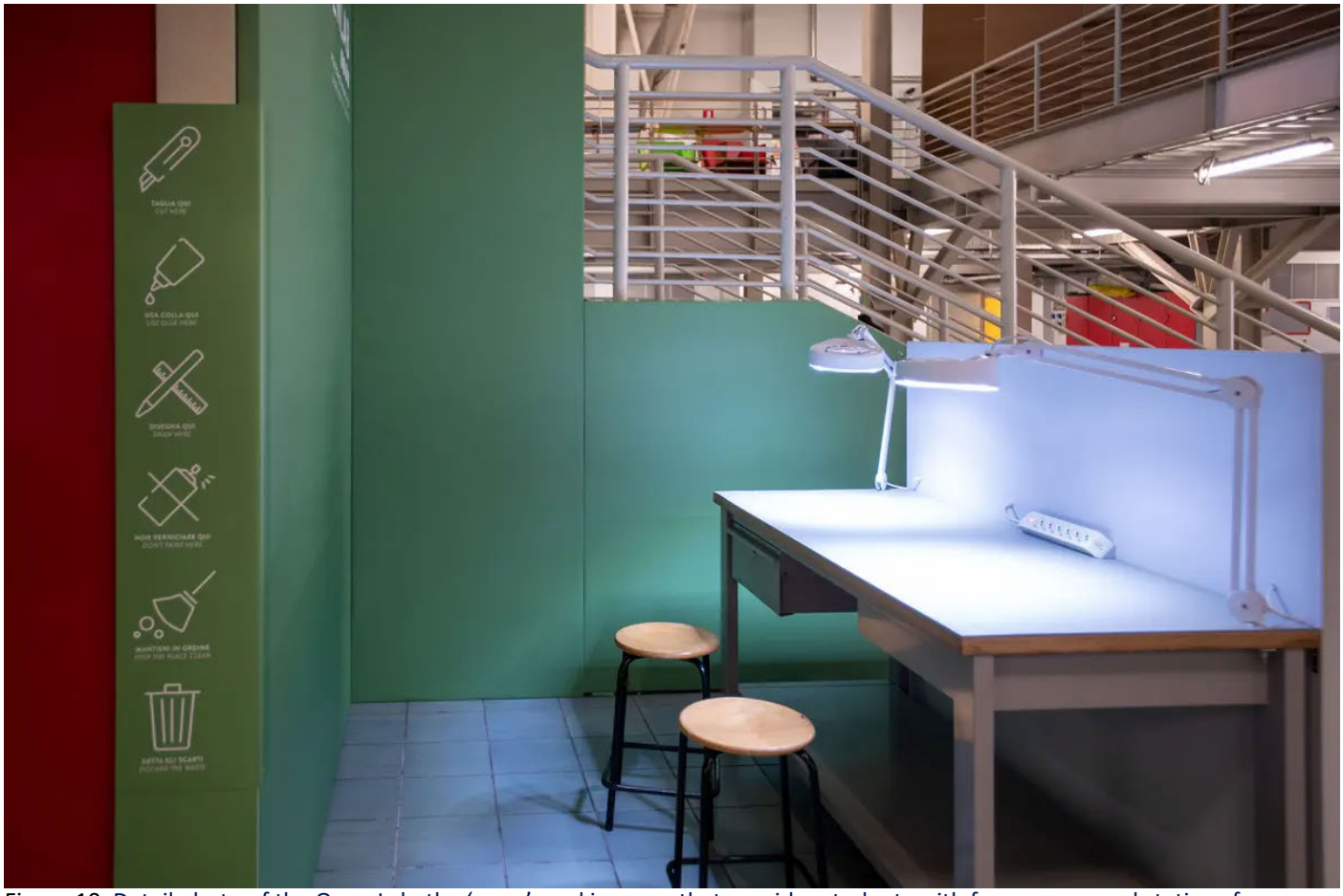

Figure 10. Detail photo of the Open Lab, the 'open' working area that provides students with free-access workstations for autonomous work.

Additionally, the School Day initiative has influenced institutional networks and international collaborations. One notable outcome has been the establishment of the Cumulus Working Group on Placemaking, an initiative that aligns with the School's growing focus on urban and systemic design approaches. Furthermore, discussions emerging from the initiative have contributed to the intention to launch a master's program in Design for Placemaking, as well as to further developments in the Master in Materials and Sustainability. These initiatives, however, require a long-term strategic investment and will likely take more than five years to fully develop and implement.
Finally, one year after the School Day 2022, the School of Design formalized and shared the "Compendium of Evolved Teaching Formats", consolidating the innovative didactic models discussed during the event. This document serves as a guideline for evolving educational methodologies, ensuring that the principles of flexibility, interdisciplinarity, and student engagement remain central to the School's pedagogical vision.

6.2 Limitations

While the School Day model has proven successful, several challenges remain in assessing its long-term impact. One of the primary limitations is the lack of a formalized impact evaluation framework that systematically tracks how co-design discussions translate into concrete institutional changes over time. Future research should develop methods to assess the effectiveness of participatory

design in shaping curricula and policy, ensuring that stakeholder engagement leads to measurable improvements in teaching quality, student experience, and institutional strategy.
Another challenge lies in the cross-disciplinary transferability of the School Day model. While the initiative has been highly effective within the design education framework, further exploration is needed to determine how co-design approaches can be adapted to other disciplines and institutional contexts. Research on participatory governance in higher education could provide valuable insights into how similar models could be integrated across faculties and universities, fostering a more inclusive and systemic approach to academic innovation.

The School Day initiative exemplifies a transformative approach to educational governance, marking a shift towards a more dynamic, co-created learning ecosystem. By embedding participatory design within academic decision-making, institutions can ensure that curricula remain responsive, adaptable, and reflective of contemporary societal needs. While challenges remain—particularly in terms of impact evaluation, scalability, and institutional integration—the initiative has laid the foundation for a more engaged, collaborative, and forward-thinking educational model.

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CONFRONTING THE LEGACY OF SLAVERY AT THE UNIVERSITY OF THE SOUTH: AN EMPATHY-BASED, STUDENT-ENGAGED COLLABORATIVE APPROACH.

Battaglia, Laura

ABSTRACT | The legacy of slavery continues to shape the relationship between Southern universities and neighboring African American communities. Institutions like Sewanee (the University of the South), re-established after the Civil War, were largely funded by Confederate slave holders to perpetuate, "...represent, protect, and promote the South's civilization of bondage; and launched expressly for the slaveholding society of the South" (Sewanee, 2024). This historical foundation has contributed to the marginalization of Black citizens who have "...lived and worked in the university community, built the town of Sewanee, and shaped its history" (Roberson Project, 2024).

In response, a multi-phase, cross-university initiative seeks to reconcile this history through a student-engaged memorial design project. By fostering empathy through art and design, the project encourages students to explore the complex relationships between the designer and the user, aspiring to create a memorial that honors the community's experiences and aspirations.

Architect Elgin Cleckley and others emphasize the role in design education, suggesting that empathic designers must view their work as a dialogue, saying, "we see you" and "we hear you" (Cleckley, 2024). Empathy, like other design skills, can be taught, with shared experiences and active listening recognized as crucial in projects rooted in community engagement.

This ongoing study examines the application of empathic design pedagogy across three academic semesters, incorporating reflective writing, archival research, listening sessions, interpretive mapping, shared experiences, and design/build interventions. The journey begins with a remote, community-oriented design studio, followed by a summer travel studio that immerses students in the neighborhood, providing hands-on experience and a deeper understanding of the community's historical and emotional landscape. The project is currently in the final design phase through collaborative work

between students from multiple universities, involving intermittent visits to the community.

Initial feedback from students and community members suggests positive outcomes, while also identifying opportunities for growth. Notably, trust-building exercises evolved from remote classroom interactions to direct community engagement during the intensive summer design/build session, highlighting the transformative potential of shared experiences in fostering ethical design. Additional reflections from both students and community members underscore the need for ongoing dialogue and adaptation, reinforcing empathy as a vital component of the design process. Ultimately, this project advocates for a sustained, reciprocal relationship between students and the communities they serve, deepening connections and enhancing the integrity of the design process.

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KEYWORDS | EMPATHIC DESIGN, STUDENT-DRIVEN, RECONCILIATION, REMEMBRANCE, CROSS-UNIVERSITY

1. Introduction

Many U.S. universities are beginning to confront their histories of slavery by expanding narratives of colonization, particularly in the American South. A central component of these efforts often includes the construction of a physical memorial—a space intended for healing, reflection, and acknowledgment by descendant communities, university populations, and the broader public. At institutions like the University of Virginia, where the Memorial to Enslaved Laborers was recently completed, such sites foster dialogue and historical recognition. However, these projects are typically executed by professional design firms, with student involvement confined to early research phases. This structure limits opportunities for students to engage in the full arc of care-centered design.

In contrast, the *Sewanee Praises* project presents a new model. Designed entirely by students in close collaboration with the historically Black St. Mark's community in Sewanee, Tennessee, the project embodies a care-based approach to restorative justice and historical reckoning. Rooted in the ongoing reconciliation process at the University of the South, *Sewanee Praises* is described as an "incubator of innovative teaching and research tools" (Roberson Project, 2025). The initiative brings together students and faculty from the University of the South (Sewanee), Virginia Commonwealth University (VCU), and Virginia Tech (VT) to honor the Black citizens of St. Marks who "lived and worked in the university community, built the town of Sewanee, and shaped its history" (Roberson Project, 2024).

While community-based and service-learning projects often offer students valuable real-world experience—especially in client engagement—*Sewanee Praises* was far more than a conventional academic exercise. It served as a platform for revealing the buried history of St. Mark's and confronting the enduring legacies of institutional slavery on university grounds.

Ethically, the process began with deep listening to the individual stories of St. Mark's residents, guided by empathy rather than prescription. The pedagogy privileged inquiry over resolution—seeking instead of determining, asking instead of asserting. This approach cultivated a design process open to discovery and experimentation, free of assumptions about what the memorial should be. By embracing vulnerability, students and faculty worked to unravel the complex and often painful relationship between the community and the university, ensuring the final design was shaped by the aspirations and lived experiences of St. Mark's residents.

Importantly, the relationship between the student designers and university leadership was supportive but deliberately distanced. As DiSalvo (2022) argues, detaching design work from dominant forms of institutional governance—and from the instrumentalism and functionalism characteristic of professional practice—can allow designers to remain attuned to the needs and narratives of the communities they serve. In that spirit, *Sewanee Praises* operated independently of formal university oversight, enabling the academic team to center the voices of their community partners fully and without compromise.

2. Empathy as a design tool

2.1. A brief history

Empathy s a longstanding and multifaceted concept, with definitions that vary across disciplines and contexts. Empathy can be traced back to Ancient Greek philosophy, where Aristotle touched on its aspects in *Nicomachean Ethics*. In the late 19th and early 20th centuries, German philosophers Robert Vischer (1873) and Theodor Lipps (1903, 1906) expanded the concept through the idea of *Einfühlung*, or "in-feeling," which emphasized an emotional resonance with others' experiences. However, it was not until the early 21st century that empathy was explicitly theorized as a design strategy in product and industrial design.

The term "empathic design" was popularized by Leonard and Rayport (1997), who argued that understanding users' emotional and sensory experiences could spark innovation and lead to

more human-centered solutions. In their article *Spark Innovation Through Empathic Design*, they introduced a five-stage methodology: Observation, Capturing Data, Reflection & Analysis, Brainstorming Solutions, and Developing Prototypes. While this approach marked a significant paradigm shift within design disciplines, its application has been largely confined to consumer products and market-driven outcomes. This raises a critical question: How can empathy be meaningfully integrated into the design of public spaces dedicated to healing, remembrance, and reconciliation?

Research in inclusive design methods offers promising pathways. Co-design—originating in Swedish trade union systems design—and participatory design prioritize the active engagement of users in shaping outcomes. Similarly, Human-Centered Design, widely promoted by IDEO, places empathy at the core of understanding and authentically reflecting users lived experiences (Koskinen et al., 2014).

Complementing these methodological frameworks are phenomenological perspectives that explore the embodied and emotional dimensions of space. Heidegger's hermeneutics (*Being and Time*, 1967) and Juhani Pallasmaa's *Empathic and Embodied Imagination* (2015) offer deeper insights into how humans perceive and experience environments through all the senses, suggesting that empathetic engagement with place is both intuitive and interpretive.

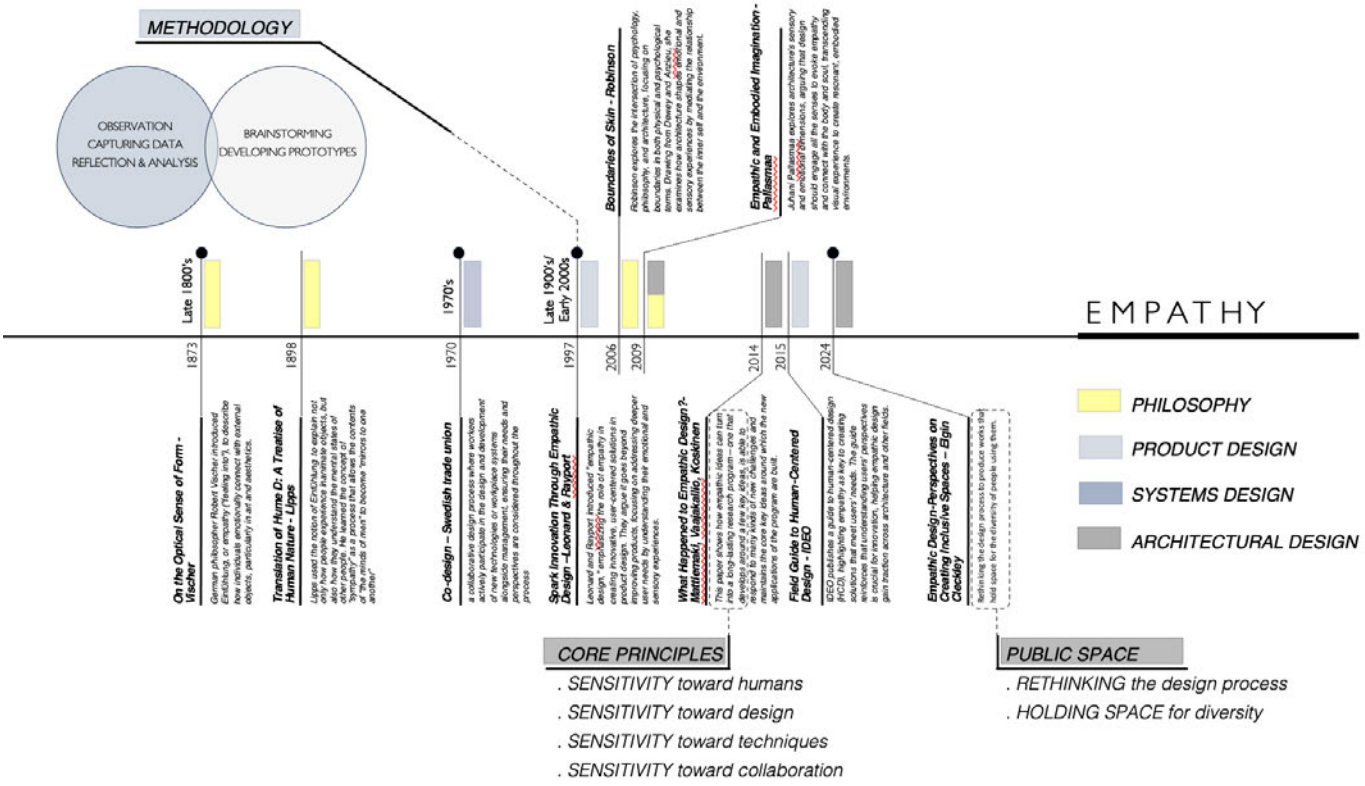

Figure 1. Excerpt from Empathy Timeline, Battaglia Laura, 2025

2.2. An empathic approach for care designers

Designing memorials for historically marginalized communities presents significant challenges for those who are outside those communities. Empathic design offers a pathway to bridge this gap by emphasizing a shared commitment to care—what Tronto (2020) describes as "caring

with" and Lamberty (2012) frames as "accompaniment." Jane Fulton Suri (2003) similarly argues that making sense of unfamiliar experiences requires intentional learning and identification with others. Educator Elgin Cleckley extends this perspective, emphasizing that empathic designers must embrace an "...iterative, evolving process that communicates 'we see you' and 'we hear you' (Cleckley, 2024)."

Equally important to the final memorial design is the process of cultivating empathy within the classroom—this is the central focus of the *Sewanee Praises* initiative. Drawing on methodologies from product design research and participatory design, this work shifts the emphasis away from consumer-driven outcomes toward a deeper engagement with people and place. In working closely with the St. Mark's community in Sewanee, Tennessee, the project seeks to understand their values, history, and lived experiences. At the same time, it fosters a heightened sensitivity among design students—a sensitivity that, as described by Koskinen, Mattelmäki, and Vaajakallio (2014), encompasses attentiveness to people, to the design process, to tools and methods, and to collaborative relationships. These dimensions of sensitivity are used below to categorize the various aspects of the *Sewanee Praises* project.

3. Applications

3.1 Sensitivity toward community partners

The project began in a sophomore interior design studio in the spring of 2024, where students engaged with the St. Mark's community through foundational exercises:

- Establish communication between students and community members.
- Prioritize relationship-building before conceptualizing memorial designs.

One of the primary challenges was the 600-mile distance between the university and Sewanee, Tennessee. To foster long-distance relationships, the team adopted a contemporary take on the tradition of pen-palling—combining Zoom and email with handwritten letters to add a personal, tactile dimension. Each student was paired with a community member, allowing for both group discussions and intimate, one-on-one conversations that encouraged deeper storytelling and connection.

Throughout these exchanges, students remained actively engaged in the act of "making." They created postcard-sized graphic responses and three-dimensional interpretive collages that served as both reflective tools and visual offerings. These early design gestures allowed students to develop a nuanced, sensitive understanding of their partners before beginning the memorial design work. At the same time, they offered community members a tangible sense of involvement—participating in a process that materialized their stories and sentiments into meaningful artifacts.

Figure 2. Sophomore interior design studio interpretive tiles and final design: Tile 1-Lily Corbin . Tile 2 *Fragments*-Elena Curtusan . Tile 3 *Roots*-Camila Rosenbrock

The spirit of engagement deepened during a VCU summer design-build fieldwork studio, in which students traveled to Sewanee for direct collaboration. The studio emphasized empathic design principles and pre-design inquiry, continuing the spring semester's emphasis on listening, reflection, and relationship-building.

The summer studio included shared meals, storytelling sessions, and participation in beloved community traditions. The Memorial Day picnic—a cherished event at the center of the St. Mark's neighborhood—became a touchstone for collective memory and joy. Students and community members bonded over music, dancing, karaoke, and a lively Soul Train line—each a moment of connection that transcended typical academic frameworks.

The studio culminated in the creation of a physical sculpture marking the future memorial site, a piece shaped by the relationships and experiences formed during the week. For many, it marked a turning point. As one community member shared, "It was the first time the memorial felt like a real possibility" (S. Taylor, personal communication, Jan. 20, 2025).

Figure 2. Summer intensive design + build interior design studio at Sewanee University and St. Mark's Neighborhood

3.2 Sensitivity toward design

Students who participated in both the sophomore studio and the summer intensive served as essential links across design phases. Through both remote and in-person engagement, they developed a deep appreciation for the empathic design process—an understanding they carried forward into the fall semester and shared with a new cohort of students. These returning students recognized that personal relationships with community partners were

fundamental to memorial design; they affirmed that meaningful design could not emerge without first listening to and reflecting on the stories of those being honored.

Drawing from Pallasmaa's phenomenological perspective, students found that visiting the site in person was invaluable for cultivating sensitivity toward the spirit of place in their designs. While early digital correspondence and letter writing revealed the community's reverence for the natural landscape, it wasn't until students physically walked through the densely forested terrain of the neighborhood and stood on the edge of the Cumberland Plateau that they fully grasped the emotional weight of those sentiments. This immersive, sensory experience fostered a heightened sensitivity to materials, sound, light, and color that would later inform their design decisions.

Site visits also provided critical opportunities for experiential learning. Students participated in campus and neighborhood tours, which included Confederate monuments on campus and the dual cemeteries—White and Black—connected by the newly constructed Heritage Trail. These experiences deepened students' understanding of the university's entangled histories and its relationship with the St. Mark's community.

It is perhaps no surprise that the stained-glass windows in the university's Episcopal Church later inspired the memorial's design—reimagined not as a passive reflection of institutional legacy, but as a new, vibrant form meant to lift and amplify the voices of the St. Mark's community.

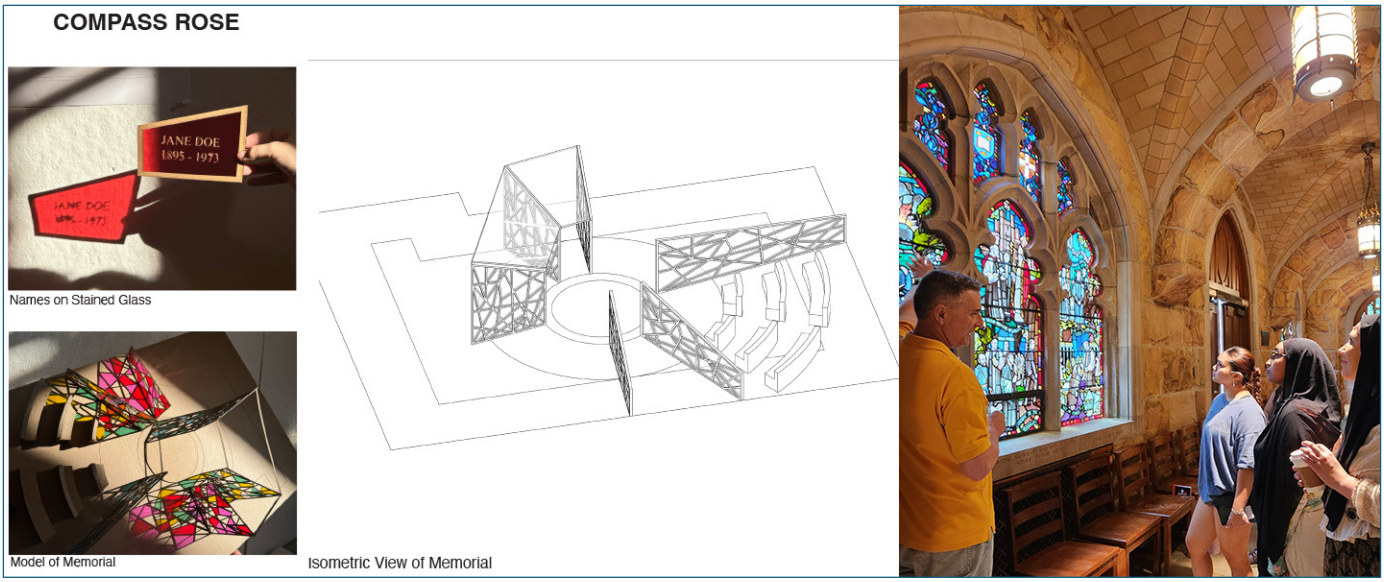

Figure 3. Senior interior design studio concept design: Eiman Rasheed, Sophie Myers, Stasia Torres-Lara . tour of Episcopal Church

3.3 Sensitivity toward techniques

Many academic design studios emphasize students' artistic autonomy and the development of fundamental formal design skills. In contrast, community-based projects require young designers to engage directly with others—through research, dialogue, and relationship-building—fostering empathy, trust, and a deeper sense of responsibility.

The final memorial design for the St. Mark's community emerged during the fall 2024 semester. Its success depended not only on design skill, but also on the ability to translate and embody the community's ethos within the final concept. Following months of collaboration with the St. Mark's community, a new cohort of students from Virginia Commonwealth University (VCU) and Virginia Tech (VT) was tasked with advancing the project. To prepare this group, it was essential to transfer the accumulated knowledge, experiences, and community sentiments from previous phases.

Pecha-Kucha style presentations were made the first week of class, using Zoom to connect VCU, VT and Sewanee University. Previous participants, including students and professors alike, shared deeply personal reflections and lessons learned, highlighting the important aspects of the site, significant community stories, and personal reflections.

VCU students who had previously participated in the spring studio and summer design-build intensive played a key role in guiding the new cohort. Beyond the formal presentations, they contributed to studio visits and participated in design critiques, adding depth, nuance, and continuity to the design process. Their engagement lent credibility to the work and helped ensure that the community's voice remained central.

The fall curriculum was intentionally structured to support this continuity and reinforce the collective commitment to honoring the legacy of St. Mark's. Key strategies included:

1. Establishing Shared Expectations – Upholding high standards for design excellence, empathy and critical inquiry.
2. Cross-University Collaboration – Encouraging interdisciplinary teamwork between VCU and VT students.
3. Studio Exchanges – Facilitating in-person visits that deepen relationships and enriched design discourse.
4. Skill-Based Teaming – Structuring assignments to leverage individual strengths and areas of expertise.
5. Virtual Collaboration – Using platforms like Zoom and Discord to maintain consistent engagement despite geographic separation.

Together, these efforts fostered a learning environment grounded in reciprocity, shared experience, and collective responsibility—ensuring that the final memorial design was both thoughtfully conceived and deeply rooted in community values.

3.4 Sensitivity toward collaboration with community

The final semester served as a powerful experiment in cross-institutional and community collaboration among students and faculty from Virginia Commonwealth University (VCU), the University of the South (Sewanee), and Virginia Tech (VT). As in previous semesters, the studio was anchored by Zoom conversations and in-person visits to the St. Mark's community—one early in the term, and another at its conclusion.

The first in-person visit featured a design charrette, intentionally structured to foster hands-on,

equitable participation. Long, narrow tables covered with rolls of drawing paper were arranged to encourage collective sketching, dialogue, and shared making. Students and community members worked side by side, blurring the boundaries between designer and client. At the end of the session, students facilitated a group reflection to capture emerging ideas and begin forming a shared vision. Throughout the room, drawings and models from prior semesters were displayed—not as static artifacts, but as living documents of an evolving process that continued to honor earlier contributions.

A transformative moment came mid-semester, when St. Mark's community members visited VCU in Richmond, Virginia and VT in Blacksburg. This reciprocal gesture was deeply meaningful. It allowed community members to experience students in their academic contexts and, in many cases, reshaped assumptions about the nature of design education and practice. Just as students had been welcomed into the daily life of Sewanee, this visit offered community members a window into the learning environments where their stories were being honored and interpreted.

Figure 2. Summer intensive design + build interior design studio at Sewanee University and St. Mark's Neighborhood

This exchange underscored the critical importance of presence—both physical and emotional—in building trust and sustaining meaningful collaboration. It reflected an ethic of reciprocity: the understanding that showing up, being seen, and engaging across spaces of difference are themselves acts of care and commitment.

3.5 Sensitivity toward collaboration with each other

Developing and refining a final memorial design with 21 students across multiple universities required a deliberate and highly coordinated approach. Project teams were strategically diversified to explore the memorial from multiple angles—ranging from architectural and landscape design to broader master planning, interpretive programming, and memorialization strategies.

Students were challenged to set aside individual design ambitions in service of a shared vision, working collaboratively toward goals defined through ongoing dialogue with the St. Mark's community. The process emphasized collective authorship, with community priorities consistently guiding decision-making and creative direction.

Figure 4. Final Memorial Design produced by students from VCU Interior Design + VT Architecture

4. Conclusions

4.1. Modes of Communication

Letter writing fostered vulnerability and meaningful connection between students and community members, offering a slower, more reflective form of dialogue. Community partner Evelyn Patton described it as a return to the "lost art" of letter writing (E. Patton, personal communication, Jan. 20, 2025), while student Elena Curtusan remarked that it encouraged a level of openness not easily achieved through other media.

In contrast, Zoom often proved limiting—technological difficulties and the formality of the platform created barriers to authentic exchange. The shift to pre-recorded video presentations enhanced engagement, allowing participants to communicate more thoughtfully and on their own terms. Ultimately, the process underscored the importance of persistence, creativity, and adaptability in fostering meaningful relationships across distance.

4.2 Empathic Design Techniques

Abstract and interpretive projects deeply resonated with the St. Mark's community, particularly due to the in-person engagement that took place during the summer. These face-to-face interactions enriched dialogue and reinforced the significance of the students' work. Community member Shirley Taylor praised the interpretive collages, noting that they demonstrated students' deep listening and sensitivity: "They helped [the community] to see a vision" (S. Taylor, personal communication, Jan. 20, 2025).

Studio techniques used throughout the spring and summer phases are regarded as especially effective in conveying emotion and complexity. Evelyn Patton remarked that the abstraction allowed her to grasp the expressive nature of the projects, remarking that they "unveiled all the different layers of the overall project" and conveyed emotion in ways that felt authentic (E. Patton, personal communication, Jan. 20, 2025).

From the students' perspective, survey responses revealed a shift in design thinking. One student wrote, "I learned to design from a different perspective and not project my personal vision on a design that will represent others" (Student Survey, 2024). These reflections highlight how abstract forms—when grounded in empathic engagement—can serve as powerful tools for fostering understanding and trust within communities.

4.3 The Importance of Presence

Physical presence in Sewanee proved transformative for both students and community members, fostering trust, deeper understanding, and providing a necessary space for difficult yet meaningful conversations. Students consistently reported that in-person engagement—particularly during the summer studio and fall studio visits—was invaluable. Much of their design inspiration originated from direct encounters with the community and the land itself.

Given the St. Mark's residents' profound connection to Sewanee as a place, students were able to gain a more nuanced understanding through immersion in that environment. As Yelenna Angeles reflected:

> "Touring the university and visiting the landmarks that surround it made it easy to visualize the stories that the community members shared with us. I was able to gain a better understanding of what life is like in Sewanee. This environment ended up playing a huge role in my design".

Similarly, Lily Corbin, a sophomore who had previously worked with a community partner remotely, echoed this sentiment:

> "Meeting her in person made it feel real," she wrote in her final reflection. Corbin noted that in-person meetings felt more natural than Zoom calls, adding that face-to-face interaction gave her partner "space to open up" and reassured her that "the students are engaged and listening."

Members of the St. Mark's community shared this sense of connection, particularly with the students who participated in the summer studio. Their curiosity and awe toward Sewanee's natural beauty often sparked nostalgic memories. Shirley Taylor remarked that it reminded some community members of their own childhood: "...when they were young" (S. Taylor, personal communication, Jan. 20, 2025").

Furthermore, physical presence also created a safe context for vulnerability and honest dialogue. One of the most difficult but necessary topics raised was slavery—a heavy and complex subject, particularly for students early in their design education. Some students initially questioned the appropriateness of engaging with such a profound theme or expressed concern about potentially causing harm through their interpretations.

However, these tensions began to dissipate during the summer's initial community storytelling event. What began as an awkward, formal gathering around a table gradually shifted into

smaller, more personal one-on-one conversations. As comfort increased, the group reconvened to share insights, creating a cycle of exchange that fostered trust. This moment became a critical turning point, allowing conversations about race, slavery, and memory to unfold with honesty and openness. The St. Mark's Community Center - long regarded as a space of safety and togetherness – was instrumental in supporting this exchange.

Ultimately, Sewanee Praises demonstrates how empathy - rooted in physical presence and active listening - can fundamentally shape both design education and the processes of memorialization. The project demonstrates how the integration of research, storytelling, and making can facilitate historical reckoning while nurturing community healing.

4.4 Personal Conclusions

I am immensely proud of the students who participated in this project. The sophomore cohort, who enrolled without prior awareness of the studio's distinctive nature, frequently encountered challenges and moments of frustration. Community-based design projects, particularly those grounded in real-world contexts, are inherently complex and often unpredictable. Although this complexity provided a rich learning opportunity, some students appeared insufficiently prepared for the multifaceted demands involved. This gap underscores the need for clearer communication regarding the studio's content and expectations prior to enrollment, thereby ensuring participation by individuals genuinely committed to the project's objectives.

The sensitive themes of reconciliation and remembrance imposed additional emotional and intellectual pressures on students, who often felt a profound responsibility to "do right by the community." In instances where communication faltered, students tended to attribute fault to the instructors, expressing frustration that was frequently rooted in a desire to identify a singular "correct" solution rather than embracing the iterative and emergent nature of the design process. From my perspective, the conceptual work functioned as a crucial intermediary, providing the community with tangible proposals that elicited valuable feedback. Indeed, insights gained from community critiques—both positive and negative—were equally instructive.

With enhanced preparatory measures at the outset, coupled with a more robust commitment to formal race-based training, I contend that engagement with this topic is entirely appropriate for design students. Existing scholarship from other institutions indicates that student participation can serve as a potential catalyst in processes of reconciliation and remembrance, particularly in the context of memorial projects.

Ultimately, physical presence proved indispensable. The students who traveled to Sewanee experienced profound personal and educational growth, and I sincerely hope that the project outcomes have had an equally meaningful impact on the community.

4.5 Next Steps

As the project enters its fundraising phase, the team remains hopeful that the university will view it not through the lens of politically charged agendas, but as one grounded in the politics

of care. In today's polarized and fear-driven political climate in the United States, an ethics-based approach—rooted in empathy, accountability, and relational trust—may seem radical. However, it is becoming increasingly vital for initiatives focused on reconciliation, remembrance, and collective healing.

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Most of all, thank you to my students. This project would not have been possible without the dedication of numerous VCU students who contributed across two semesters and a summer session. The senior cohort built upon insights from a VCU Interior Design sophomore studio, along with a select group of undergraduate and graduate students who participated in a traveling summer workshop. Their work exemplifies an extraordinary commitment to an empathic design process—one grounded in deep listening, vulnerability, and a collective vision that placed community at its center. I am continually inspired by their brilliance.

ethical leadership
a new frontier for design

Contact Improvisation and Co-design Practices

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Abstract

Is there a form of design that combines the values of performing playing, democratic practices, and co-production? I thought this contact improvisation and co-design practices workshop might provide us with a model.

In November 2023, under the COVID-19 epidemic, I organized a design workshop in BIFT university, with Ms. Liao Shuyi, co-founder of the Contact Improvisation Group in Beijing, China. 32 college students participated in this workshop, lasted for 2 months, and finally completed a series of pattern design.

Contact Improvisation is the concept originated in the United States in the early 1970s, as both a type of free dance and a flowing conversation through physical contact. There is also an inevitable connection between art and the body. So we transformed contact improvisation into drawing. Participants recorded the feelings of the physical interaction through drawing, leaving behind visual elements. These visual elements laid the foundation for the development of design. This co-design practices brought about differences from individual creations.

Figure 1. Contact Improvisation and co-design Practices, Beijing (2023)

Such a CI- co design workshop during the long-term lockdown of the COVID-19 epidemic may help bridge the gap, and play a role in rebuilding trust between people, integrating into the diversified world, and exploring all the possibilities of themselves and the surrounding environment in a group way.

This is improvising, CI- co design Practices may provide a reference for humans of different races, identities and social perceptions to live together in communities, and solve social problems and influence the ways of living together.

Research objectives

How designers lead in time of emergency, of uncertainty, of rapid decision making new co-production and co-design of solutions under the COVID-19 Pandemic.

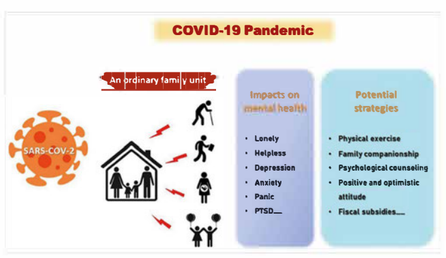


Figure 6. The effects of **COVID-19 pandemic** on mental health and corresponding solutions in different family members.(Wang L, 2022)

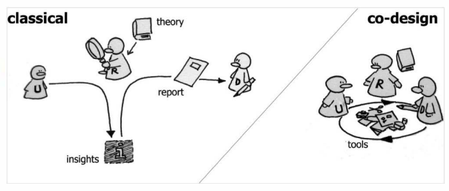


Figure 7. Classical roles of users, researchers, and designers in the design process (on the left) and how they are merging in the **co-design**ing process (on the right). (Sanders, 2008)

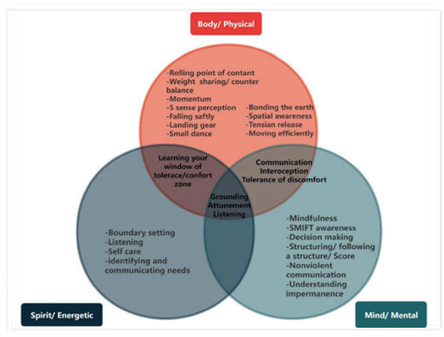


Figure 8. Venn diagram of **CI(Contact Improvisation)** skills as they pertain to body/mind/spirit. (Jackson, K. Jackson, K, 2022)

Research process

The Therapeutic Use of CI: CI dancers often describe transformative effects, including increased self-awareness and emotional maturity(Kaltenbrunner, 1998). CI may also improve interpersonal skills (Jackson, K, 2022).

As a field that stresses the importance of attunement, connection, and creativity, co-design shares many values with contact improvisation (CI). This CI- co design workshop explored the potential of using elements of CI as interventions in co-design.

The rationale：CI- co design workshop (pattern design in print-textile)

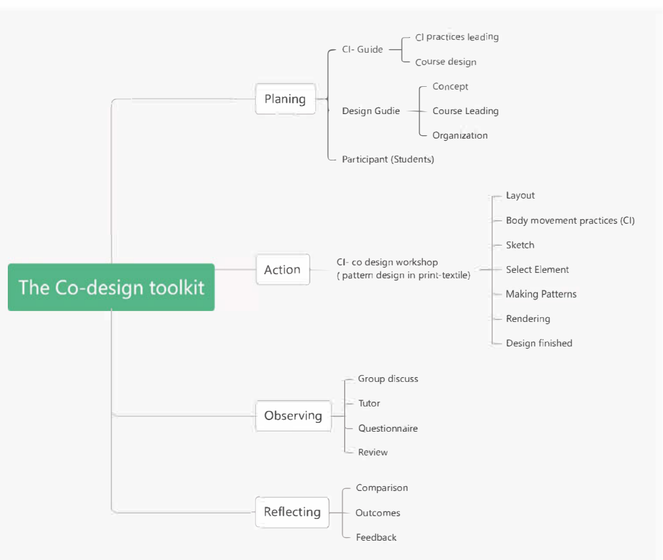


Figure 11. The co-design toolkit: CI- co design workshop (pattern design in print-textile)

Action 2: Sketch (Group work)

Through the practice of CI, we broke the feelings of isolation during lockdown in the covid-19, strengthened the connection between individuals through the physical contact, and felt the support of each other in the mutual relationship, and established the trust of the group, which laid a good foundation for the co-design creation. Then, we started the group work of drawing sketches.

Figure 13. The process of drawing sketches in group work

Obtained results (Design finished and rendering)

32 college students participated in this workshop, which lasted for 2 months, and finally completed nearly 80 patterns for print textile. In this workshop, all the participants learned the professional pattern making skills under the guide of the professional designer. We also organized group tutorials and discussions.

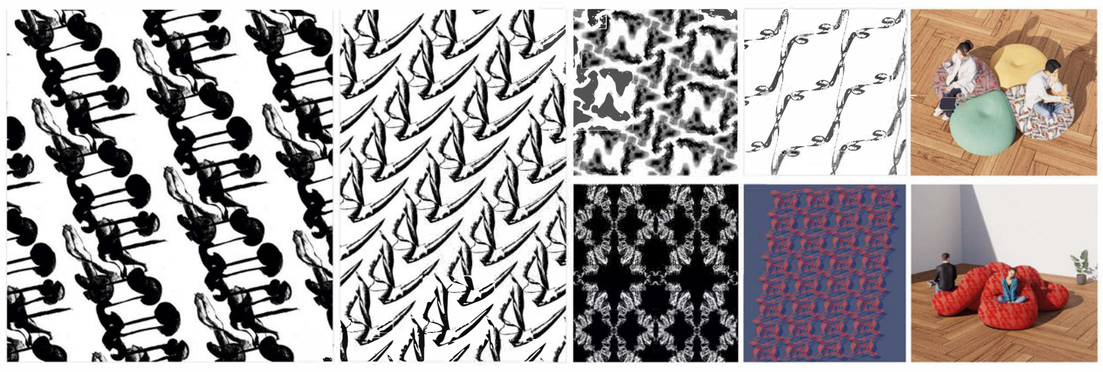


Figure 15. The Process of drawing sketches in group work

Research background

Here is the case study and other use cases of this Contact Improvisation methodological approach experienced in the past (since 1970), especially in art and design.

Figure 2. The impromptu performance that took place in 1972 at the John Weber Gallery in New York. (Photography: Peter Moore)(Singer, 2022)

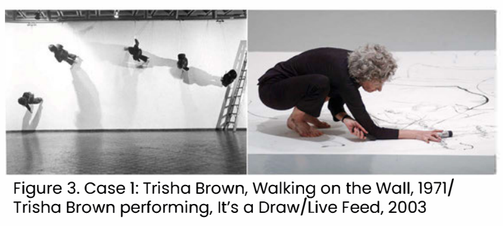


Figure 3. Case 1: Trisha Brown, Walking on the Wall, 1971/ Trisha Brown performing, It's a Draw/Live Feed, 2003

Figure 4. Case 2: A design process with the four stages: Movements, 2D reflections, initial models and final work (Caner, 2021)

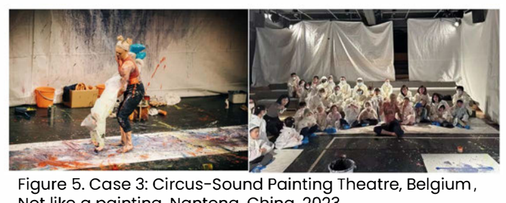
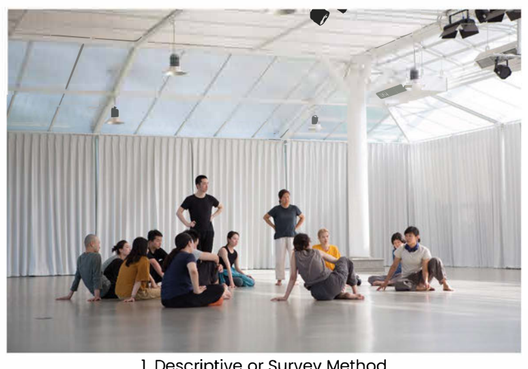


Figure 5. Case 3: Circus-Sound Painting Theatre, Belgium, Not like a painting, Nantong, China, 2023

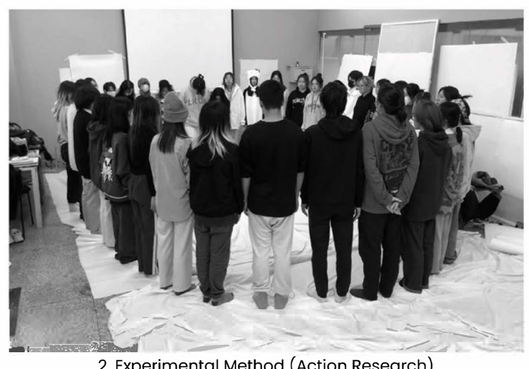
Methodology and tools

How CI(Contact Improvisation) effects and extends the way of co-design? CI is a dance form originating in the 1970s that uses physical contact between partners as thestarting point for improvised movement. Anyone can practice CI, and it's a dance therapy for older people, kids, injured anddisabled people(Nina Dibb,2013), that we no longer focus on the skills but the possibility it enables: What does it do? How can we use it?



1. Descriptive or Survey Method

Figure 9. The author joined the "交叉计划"项目（The Crossing Project）by "十口无团"（Untitled Group）, and workshop in "Beijing Contact Improvisation" (BJCI) in 2022.



2. Experimental Method (Action Research)

Figure 10. Organized CI-co design workshop in 北京服装学院 (BIFT), with Ms. Liao Shuyi, co-founder of the BJCI Group in 2023, Beijing, China (32 college students participated in this workshop, lasted for 2 months).

Action 1: Body movement practices (CI)

The workshop will explore how do the feelings and thoughts behind body movements affect each other? As the presence of the body as a starting point. "contact improvisation" will be the main method of practice, in order to open the awareness of the people around and the environment, then bring this quality into co-design thinking.

Figure 12. Body movement practices (CI) guided by Liao Shuyi

Action 3: Design process (Select element and making patterns)

Selecting Element is the professional ability for a designer, especially in pattern design of print-textile. In co design, designers should adopt two important roles actively: coordinators and facilitators. (Sui, 2003) Also,designers will need to play a role on the co-designing teams because they provide expert knowledge that the other stakeholders do not have.(Sanders, 2008). Here we still need the professional designers or skills to helping making patterns.

Figure 14. The process of selecting element and making patterns

Expected results

Through the practice of CI, we broke the feelings of isolation during lockdown in the covid-19, strengthened the connection between individuals through the physical contact, and felt the support of each other in the mutual relationship, and established the trust of the group, which laid a good foundation for the co-design creation. Then, we started the group work of drawing sketches.

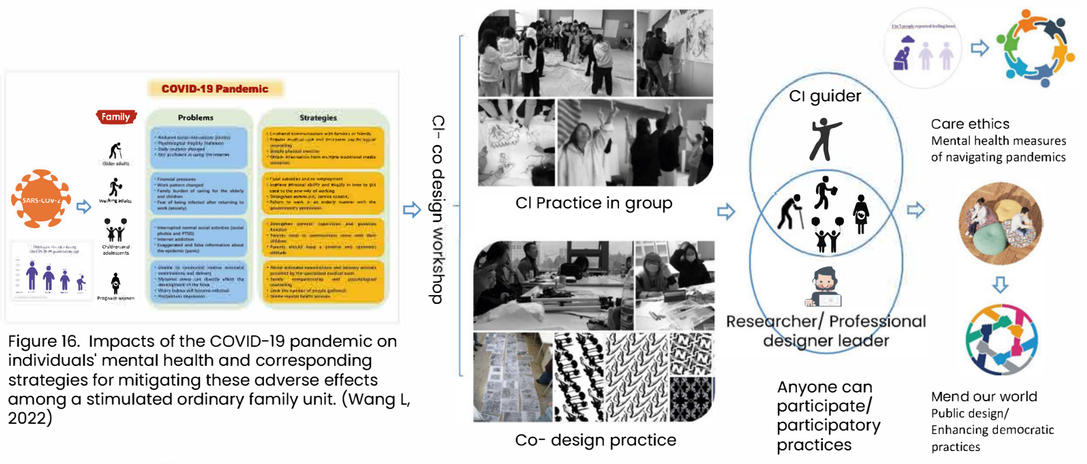


Figure 16. Impacts of the COVID-19 pandemic on individuals' mental health and corresponding strategies for mitigating these adverse effects among a stimulated ordinary family unit. (Wang L, 2022)

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CULTIVATING CARE: ETHICAL PEDAGOGY FOR COLLABORATION IN PUBLIC SPACES

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ABSTRACT | We are witnessing a significant shift toward inclusivity in the global design paradigm, where thought leaders emphasize collaborative design. Opposed to traditional perspectives that hail the designer possessing awareness of special forms of knowledge and place them in an authoritative position, designers are now seen as integral team members (Herriott, 2023), contributing to a larger context and promoting collaborative good (Costanza-Chock, 2020). The new paradigm advocates for addressing complex global challenges through holistic, socially responsible, and systems-oriented approaches (Lima, 2023) (Norman, 2024). While this conversation about design practice is infiltrating mainstream thought, there is yet to be radical shifts in design pedagogy needed to sustain this momentum. Engaging new generations of designers in social challenges necessitates rethinking their roles in social innovation processes (Tjahja & Yee, 2022). At this juncture, it is crucial for educators to envision a pedagogy for a just design future that embodies a culture of care. Furthermore, there is increasing recognition of the socio-political contexts shaping design, emphasizing that it does not exist in isolation. While many design schools engage with communities, particularly those from lower economic strata, they often unintentionally commodify these people and places, extracting value for student learning without giving back, especially in public space and social innovation projects. <A padding

sentence, will come back> The authors have triangulated their findings from their research and praxis in three areas: a) Pedagogical design for inclusion b) Design for inclusive attitudes, and c) Reciprocal and responsible community engagement. Based on this triangulation, this abstract proposes a new schema in design education—an ethical design pedagogy infused with an attitude of care. This schema embeds aforementioned perspectives on collaborative, reciprocal design in Freire's (1970) and Hooks' (1994) critical pedagogies. The principles of this schema are:
Positionality:
1. Collaborative, Designer-Uncentered Approach (democratic inquiry)
2. Attitudes of Care, Inclusiveness and Equity
Methodology:
1. Cultural Sensitivity, Contextual Awareness and Real-World Contexts
2. Systems Thinking with transdisciplinary and interdisciplinary outlooks
3. Active and Engaged Learning in the Classroom
4. Reflective & Critical Practice (Awareness of Existing Power Dynamics and One's Own Process)
Impact:
1. Education to Drive Industry
2. Reciprocity of Knowledge, Care and Applicability to Real World

The paper outlines practical aspects of applying the proposed schema through two case studies of design studio modules: one in Mumbai, India, and another in Florence, Italy. Both modules were conducted for early undergraduate design students across various streams. By comparing two similar levels of study in distinct socio-political contexts with varying levels of citizen power and agency, the case studies evaluate the schema through student work and reflections.

KEYWORDS | PEDAGOGY, COLLABORATIVE DESIGN, CARE, DESIGN JUSTICE, ATTITUDE

1. Introduction

Design discourse is shifting from hierarchical models toward inclusive, collaborative approaches. Traditionally, designers have assumed expert roles (Herriott, 2023), but contemporary thought leaders advocate for designers as facilitators in interdisciplinary teams addressing social challenges (Costanza-Chock, 2020). This shift aligns with global calls for ethical, sustainable, and socially responsible design (Lima, 2023; Norman, 2024). Despite these discussions, design education has yet to fully transform. Engaging future designers in social innovation requires rethinking their roles within complex socio-political contexts (Tjahja & Yee, 2022). While pedagogy often engages marginalized communities, reciprocity remains a

challenge, risking the commodification of lived experiences.

This paper proposes a schema for ethical, care-centered design education, integrating insights from inclusion-focused pedagogy, designer attitudes, and responsible community engagement. Informed by Freire (1970), hooks (1994), and Giroux (2011), it examines two undergraduate studio modules in Mumbai and Florence to evaluate its applicability across contexts, offering insights into shaping responsible, engaged design practitioners.

Literature Review

The investigation into literature for this paper began with a reflection on "Pedagogy of the Oppressed" (Freire, 1970) and subsequent, critical reflections on the same over the years. Two such reflections and evolutions of the text are regarded as seminal works today - "Teaching to Transgress" (Hooks, 1994) and "On Critical Pedagogy" (Giroux, 2011). Both texts had their unique additions - Hooks' work brought in concepts of intersectionality, love, and emotional engagement in learning. Giroux's work expanded the critique to cultural and capitalistic politics including media, neoliberalism, and political resistance.

Hooks' (1994) Contribution

"Teaching to Transgress" responded to the needs of its time by expanding Freirean critical pedagogy to address race, gender, and intersectionality, advocating for an engaged pedagogy that emphasized personal experience, dialogue, and the dismantling of hierarchical power structures in education. Rooted firmly in feminist ideology, it brought with it discussions of teacher-student relationship grounded in empathy and care.

Giroux's contribution

Giroux's On Critical Pedagogy (2011) took on a more systemic adaptation of Freire's ideas to counter and question the increasing commodification of education under neoliberalism, calling for schools and universities to become sites of resistance where students develop critical agency to challenge systemic injustices.

In the seminal text "The Field of Cultural Production", Bourdieu(1993) discusses the distinction between autonomous and heteronomous pole - the former the concept of prioritization of symbolic capital over commercial success and the latter, the practice of cultural producers catering to market demands, prioritizing economic success and mass appeal. Many like Giroux (2011), highly critique modern neoliberal education as highly market driven and as leaning towards heteronomous pole. Therefore, if design is to shake off the neo-liberal, capitalistic influences, the pedagogy needs to reflect a less market-centered and society-centered approach.

Contemporary Design Literature

In order to contextualise critical pedagogy to design and to focus on the contemporary issues pertaining to design, a literature review of contemporary mainstream literature in design was conducted. Contemporary scholarship emphasizes ethical, non-hierarchical design education,

where designers act as facilitators rather than central authorities (Costanza-Chock, 2020; Lima, 2023). Rooted in designer-uncentered methodologies (Busciantella-Ricci et. al, 2024), this approach prioritizes collaborative, community-led engagement over expert-driven models. Developing new frameworks grounded in democratic inquiry is essential, as the absence of structured methodologies risks sustaining hierarchical and extractive pedagogical practices.
Furthermore, reciprocity of care in design education remains a pressing concern. Many institutions incorporate field visits and community engagement activities as part of active learning, with the aim of learning from real-world co-creation experiences. However, such engagements often commodify the knowledge and labor of marginalized communities, especially when socio-economic power asymmetries exist between students and communities. This is evident in cases where artisanal crafts, street vendors, and low-income workers become subjects of student projects without reciprocal benefits (Buckley & Sabreen, 2017).

Drawing inspiration from the above literature, the authors discussed and meditated on what a contemporary interpretation of these texts would be, specifically in the context of design education. Thus was born the new schema for pedagogy "Cultivating Care" proposed in this paper. The following central concepts emerged as the schema from this review:
With respect to Positionality i.e. how we situate ourselves in design & education, two key observations emerged:

a) Collaborative Design Paradigm and Designer-Uncentered Approach (democratic inquiry): While participatory approaches have long been advocated (Giroux, 2011), their significance in design education lies in challenging dominant paradigms such as designerly ways of knowing (Cross, 2006) and Rams' ten principles of good design (De Jong, Klemp, & Mattie, 2021). Herriott (2023) critiques the overuse of Cross's framework for elevating designer expertise and marginalizing non-designers, while Rams himself acknowledged the evolving nature of his principles. Contemporary scholarship increasingly critiques the myth of singular expertise, calling instead for co-design and community collaboration (Costanza-Chock, 2020; Norman, 2023; Lima, 2023; Authors, 2024). Design is reframed as democratic inquiry (DiSalvo, 2022), where problem-solving becomes collective sense-making. Two of the authors have also proposed "Radical Inclusive Attitudes," an epistemological model advocating for a Designer Un-Centered approach (Buscinatella-Ricci et. al, 2024), which diverges from traditional notions of "design as activism" or "force for good" that may still centralize designer authority if not rooted in the right attitudes.
b) Attitudes of Care, Inclusiveness and Equity: Contemporary design must position the designer within collaborative ecosystems to foster systemic, socially responsible outcomes (Costanza-Chock, 2020). Educational frameworks increasingly embed care and collaboration into curricula, with Tjahja and Yee (2022) advocating for pedagogies that redefine designers' roles through equity and care. To deepen ethical engagement,

Designing for Inclusive Attitudes was proposed as a framework that integrates inclusive design with attitude formation, grounded in the multi-component model of attitudes (Eagly & Chaiken, 1993; Maio et al., 2019). Drawing on Self-Perception Theory (Bem, 1972; Maio & Haddock, 2009), it suggests that behaviors—such as co-design and community engagement—actively shape ethical dispositions. Thus, experiential learning, reflection, and reciprocity are essential to cultivating meaningful, ethical design practice.

With respect to Methodology i.e. how we approach learning & design practice, the following parts of the schema were derived:

c) Cultural Sensitivity, Contextual Awareness, and Real-World Contexts: Design education must move beyond abstraction to engage with socio-cultural realities. Dominant frameworks often impose Western-centric narratives, reinforcing epistemic hierarchies (Escobar, 2018), while universalist models overlook local knowledge systems (Otto & Smith, 2013). Decolonial design emphasizes valuing indigenous and vernacular perspectives (Tunstall, 2023), asserting that design should emerge from societal contexts (Hara, 2015) rather than being externally imposed. Without contextual sensitivity, designers risk creating "techno-sterile solutions" that perpetuate deficit-based narratives (Papanek, 1984). Emphasizing power, privilege, and relationality, design must become collaborative, not prescriptive (Costanza-Chock, 2020; Udoewa, 2022). Bridging theory and praxis requires immersive fieldwork, community co-creation, and iterative feedback, enabling place-based design rooted in complex socio-ecological systems (Manzini, 2015; Deserti & Rizzo, 2023).

d) Systems Thinking with transdisciplinary and interdisciplinary outlooks: Lima (2023) and Norman (2024) advocate for integrative approaches that promote partnerships across disciplines and communities to address global challenges effectively. Moreover, the scope of contemporary designers has expanded to include complexities such as climate change and societal issues. As a result, systems thinking has become even more crucial. However, design education is struggling to adapt to these changes, as demonstrated by the lack of designers in high-level positions within organisations and government (Meyer & Norman, 2020).

e) Active and Engaged Learning in the Classroom - Contemporary research points to the effectiveness of active learning techniques in classrooms (Dixit, Bedekar, Jahagirdar, & Sathe, 2020). Through techniques such as group discussions, case studies, and hands-on activities, students develop a deeper understanding and can better apply their knowledge to solve real-world problems. Research also highlights the positive impact of these techniques on student engagement, retention, and skill development. Authors such as Zimmerman (2014) have extensively explored the role of games in simulating real-world complex systems. In his 2013 article, "Manifesto for a Ludic

Century," he discusses how games serve as metaphors reflecting specific systems, offering players active learning experiences. Therefore, incorporation of games in the classroom to simulate real-life situations can allow students to explore complexities of various situations before and after site visits.

f) Reflective & Critical Practice (Awareness of Existing Power Dynamics and One's Own Process) - Students engaging with marginalized communities often encounter conflicting perspectives that challenge their preconceived notions. Maio & Haddock (2009, p. 34-35) describe attitude ambivalence as the coexistence of positive and negative perceptions about an issue. This ambivalence can create discomfort but is essential in fostering critical thinking and ethical awareness. Encouraging iterative reflection through structured self-evaluation exercises and peer discussions helps students develop more nuanced perspectives on ethical design practices. The seminal work "The Reflective Practitioner" (Schön, 1983) explores how professionals need to engage in reflective practice to navigate complex, uncertain, and dynamic situations. He critiques traditional technical-rational models of knowledge, arguing that expertise is not just about applying predefined theories but also about reflecting in and on action.

With respect to Impact i.e how education translates into broader societal change, the following parts of the schema were derived:

g) Education Needs to Drive Industry - Traditional design education has largely catered to industry needs, reinforcing existing market structures rather than challenging them (Giroux, 2011). Scholars advocate a paradigm shift toward socially responsible, ecologically regenerative, and critically engaged design (Fry, 2009; Manzini, 2015). Embedding systems thinking, critical pedagogy, and ethical frameworks enables students to understand design as a political and economic force (Escobar, 2018). Key strategies include fostering transdisciplinary collaboration, integrating activism, and decoupling design from market constraints. Ethical industry partnerships and models of civic and regenerative design illustrate how education can drive systemic change (Costanza-Chock, 2020). Justice-oriented pedagogy must shape, not mirror, future industries.

h) Reciprocity of Knowledge, Care and Applicability to Real-World: Field visits and community engagement are vital to active learning in design education, enabling co-creation and real-world applicability. However, the commercialization of higher education creates structural barriers to ethical pedagogy, fostering materialistic student mindsets and profit-oriented institutional agendas that devalue socially responsible approaches (Tsiotsou, 2024). Community engagement often risks becoming transactional, particularly when socio-economic asymmetries exist between students and communities, as seen in India's engagements with lower-income groups such as auto drivers, artisans, and street vendors—an issue intensified in Global North–South

collaborations (Buckley & Sabreen, 2017). Ethical pedagogy must counter extractive practices and promote community-led, inclusive design (Costanza-Chock, 2020), prioritizing reciprocity and care over market imperatives (Jacoby, 2015).

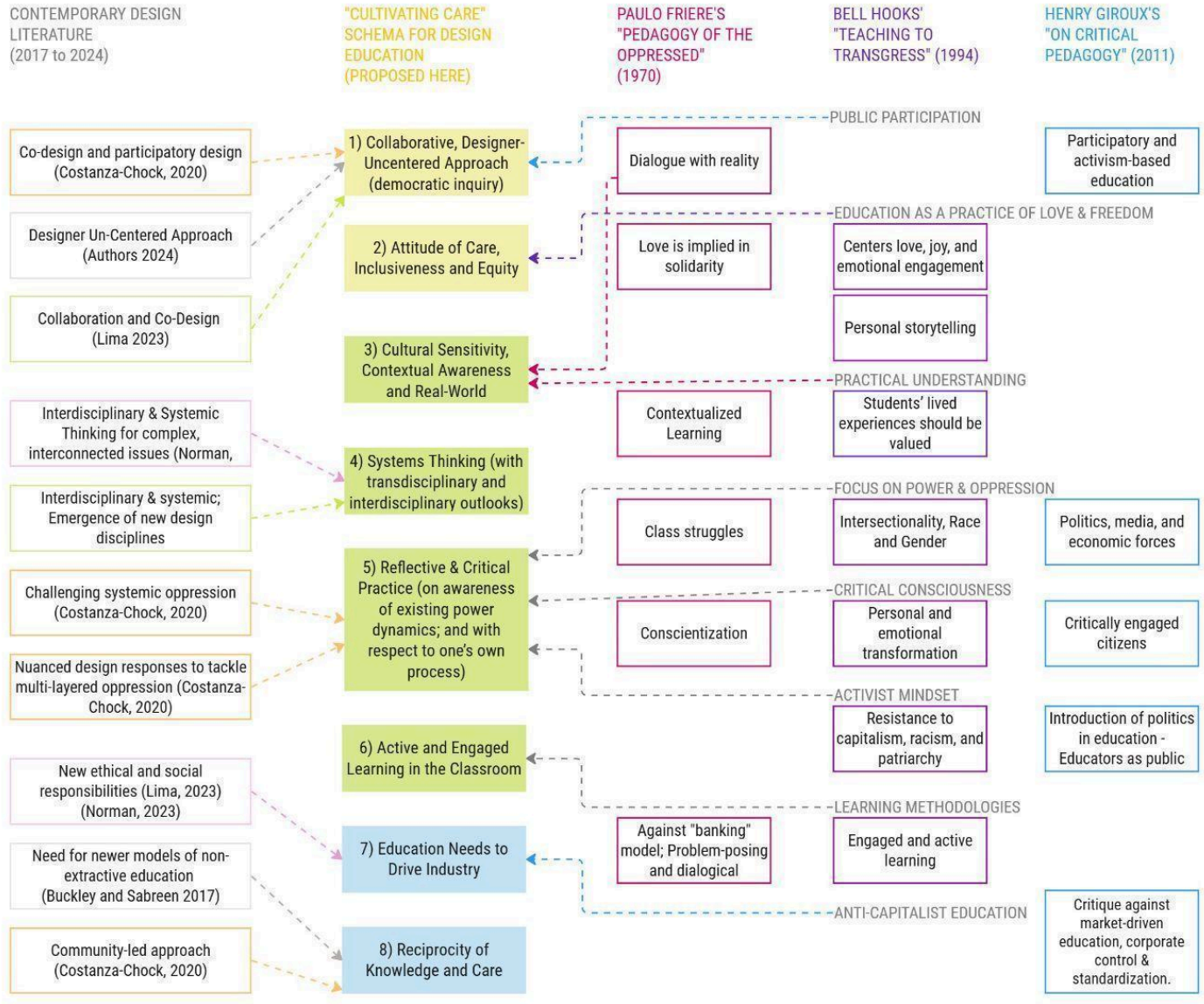


Figure 1. The above figure illustrates the development of the proposed schema based on a comprehensive literature review. The schema, represented by the central eight points, integrates pedagogical frameworks that emphasize critical pedagogy (positioned on the right) with contemporary design literature (positioned on the left). The latter highlights emerging attitudes and ways of being that are essential for the present and future of design.

Research Context

The proposed schema was applied and tested in two pedagogical contexts - through a Design Methods studio at the BITS Design School in Mumbai, India and in a course, namely 'Laboratory of Design II - Eco-Social' divided into two modules (Design for Social Innovation and Civic Design) in Florence, Italy.

Mumbai, India: The Design Methods module at the BITS Design School was conducted as a five-week studio, engaging 105 first-year Undergraduate design students across three sections. The structure of the studio was designed to introduce foundational design

research methodologies and frameworks, systems thinking, and participatory research methods. The module also introduced different types of design process models such as design thinking and the Double Diamond framework, while actively encouraging a critical outlook on these frameworks.
Each section was divided into five groups, totaling 15 groups overall, with an average of seven students per group. This collaborative structure was essential in fostering peer learning, iterative research, and interdisciplinary problem-solving. The studio's pedagogical approach combined fieldwork, hands-on participatory research, and synthesis exercises to encourage students to develop an evidence-based approach to problem definition and ideation. Through semi-structured site visits, observational studies, stakeholder interviews and participatory research, students engaged with real-world design challenges, emphasizing contextual awareness and ethical engagement. This studio was not only an academic exercise but also a pedagogical experiment in fostering ethical design research.

Florence, Italy: The "Design II - Eco-Social" course at the University of Florence is a twelve-week, second-year undergraduate course introduced in 2023-2024, with 24 students engaging in Design for Social Innovation and Civic Design. The course is structured into four sequential stages:

- Introductory Stage – Included lectures on the fundamentals of design for social innovation, civic design, co-design, service design, and speculative design. Students participated in collaborative laboratory exercises to explore key themes.
- Immersive Stage – Hands-on experiences with five local third-sector organizations, each presenting a specific context to explore and a challenge to address. Students designed and prepared toolkits for contextual investigation including engaging with stakeholders.
- Reflective and Defining Stage – Included data analysis and collaborative definition of design challenges to be addressed. This process led to the formation of project groups and the identification of themes for idea development.
- Development Stage – This phase comprised several sub-activities: a) Concept development; b) Review and feedback sessions; c) Final synthesis and presentation

Methodology

After the schema was developed from a comprehensive literature review, the authors followed two sets of methodology - a) To incorporate the schema into pedagogical practice and b) to test the effectiveness of the pedagogy in delivering the schema.

Methodology to incorporate the schema into pedagogical practice

To effectively integrate the schema into a module's pedagogical framework, we employed a multi-layered methodological approach across four distinct categories: (1) Methods Taught In The Studio, (2) Pedagogical Methods/Mechanisms, (3) Attitudes/Environment Created, and (4) Evaluation and Assessment Mechanisms. Each category aligns with principles of positionality, methodology, and impact to foster an inclusive, critically engaged, and reflexive design education.

1) Methods Taught In The Studio:
   The module incorporated a range of research and design methods that aligned with our

schema's emphasis on democratic inquiry, cultural sensitivity, and systems thinking. Participatory Action Research (PAR) (Kemmis & McTaggart, 2005) was a central methodology, positioning students as co-researchers rather than passive learners. Research Through Co-Design (Author 2, Co-author, 2024) was another methodology that aligned with PAR and was incorporated as an optional methodology for students. Additionally, various methods of participant observation including Ethnographic research methods (Pink, 2013), Systems mapping (Meadows, 2008) and Reflective Thinking (Schön, 1983). Table 1, 2 and 3 depict the methods employed and their relevance to the schema.

2) Pedagogical Methods/Mechanisms:
   The modules moved beyond passive learning through participatory methods—employing inquiry-based learning (Pedaste et al., 2015), dialogic pedagogy (Freire, 1970), and problem-based challenges to enhance student agency. Game-based learning (Gee, 2007), simulations (Zimmerman, 2014), and pop-culture role-play (Dune et al., 2016) facilitated engagement, systems thinking, and ethical reflection, aligning pedagogy with collaborative and critical learning outcomes.
3) Attitudes/Environment Created:
   Cultivating care, inclusivity, and equity relied on relational pedagogies (Noddings, 2012) and reciprocal knowledge exchange (Tuck & Yang, 2012), emphasizing co-learning and mutual knowledge construction. Emotional intelligence and reflective dialogue (Goleman, 1995) promoted ethical self-awareness. The Cognitive-Affective-Behavioral (CAB) model (Maio, Verplanken & Haddock, 2019) highlighted the integration of cognition, emotion, and behavior in attitudinal change—principles embedded throughout the pedagogical design.
4) Evaluation and Assessment Mechanisms:
   Assessment methods prioritized process-oriented evaluation (Biggs & Tang, 2011), valuing learning trajectories over final outputs. Reflexive journaling (Bolton, 2010) fostered critical awareness of bias and power, while peer assessment and dialogic feedback (Nicol, 2010) encouraged collaborative critique and perspective refinement. Real-world impact was assessed through frameworks emphasizing social implications (Brown, 2009), reinforcing meaningful design interventions.

This methodological approach embedded the design pedagogy schema conceptually and operationally through concrete teaching strategies, learning environments, and assessment. Centering participatory, reflexive, and socially engaged methods, the framework cultivates critical capacities for students to address contemporary global challenges.

Methodology to test the effectiveness of the pedagogy in delivering the schema

1) Quantitative Content Analysis of Student Work (Krippendorff, 2018; Neuendorf, 2017): A systematic content analysis similar to the quantitative newspaper analysis outlined by Krippendorff (2018) was employed on student work to identify patterns in the absorption and application of the schema's principles. This involved coding final project submissions and intermediate exercise submissions to assess how students engaged with key concepts of the schema such as democratic inquiry, interdisciplinarity and systems thinking.
2) Qualitative analysis of Student Work: This was done to complement the quantitative analysis as a way of meaning-making as suggested by Krippendorff (2018). He emphasizes that content analysis is not merely about counting words or themes but about interpreting meaning within context, making it a valuable tool for both qualitative and quantitative research. To understand the effectiveness of pedagogical methods, qualitative analysis of student work and analysis of reflective student journals was conducted. These were thematically analyzed to capture insights into student perceptions of active learning, engagement with game-based pedagogies, and their evolving attitudes toward inclusivity in design. Reflexive journaling (Bolton, 2010) was particularly useful in tracing how students internalized and critically reflected on their learning journey.

Application In Pedagogy

The detailed breakdown of application of schema through pedagogical methods in both Indian and Italian contexts are depicted in the tables below.

Table depicting methods applied in the teaching and learning space to introduce/reinforce the "Positionality" Section of the Schema - PART 1

BITS Design School, Mumbai, India › **Faculty** - Lakshmi Srinivasan, Khusboo Jogani, Malay Dhamelia (Author 1, 3 and 4) › **Guest lecture & Mentoring** by Daniele Busciantella Ricci (Author 2)	**Collaborative, Designer-Uncentered Approach (Democratic Inquiry)**	**Attitude of Care, Inclusiveness and Equity**
Methods Taught In The Studio	Participatory Action Research; Stakeholder Mapping; Research Through Co-Design (Author 2, 2024)	Ethnographic Research, Contextual Inquiry and allied Methods of Observation, Stakeholder Interviews
Pedagogical Methods/-Mechanisms	Exercises: Reflections on inclusivity in engagement; Getting feedback from stakeholders Mechanisms: Both faculty and peer assessment, Peer Feedback Loops; Student Organisation: Emphasis on Group Work - Collaboration between students made mandatory	Exercises: Analysis of field notes; Student reflected on socio-cultural factors that affected lives and livelihoods of community Mechanisms: Site Visits, Immersive Fieldwork
Attitudes/Environment created	Cognitive: Emphasis laid on learning to look at the community as the experts and the design students as the "learners" (of the context). Affective: Learning to be comfortable with discomfort Behavioural: Emphasis on depth of community participation - lead to students repeatedly returning to site to engage with stakeholders.	Cognitive: Students needed to learn about the site from diverse stakeholders (women, elderly, shopkeeper vs customer, vehicle user vs pedestrian) with different identities and understand their emotional experiences
Evaluation and Assess-ment Mechanisms	Measured through process documentation and insight generation by students. Learning Outcome Assessed: Conduct research to gather nuanced insights into user needs and contextual challenges.	Measured through qualitative community feedback and student response. Learning Outcome Assessed: Conduct research to gather nuanced insights into user needs and contextual challenges.

Figure 2. Table depicting methods applied in the teaching and learning space to introduce/reinforce the "Positionality" Section of the Schema - Part 1.

University of Florence, Italy
- **Faculty** - Daniele Busciantella Ricci (Author 2)
- **Supported by two faculty members (contract professors)** - Marco Berni, Riccardo Luciani

Table depicting methods applied in the teaching and learning space to introduce/reinforce the "Positionality" Section of the Schema - PART 2

	Collaborative, Designer-Uncentered Approach (Democratic Inquiry)	Attitude of Care, Inclusiveness and Equity
Methods Taught In The Studio	Research Through Co-Design (Author 2, 2024)	Self-reflection process; Personal toolkit co-creation; Secondary data collection; Immersive experiences; Field observations; Embedded for a day (with the usage of the toolkit); Challenges exploration; Design ethnography
Pedagogical Methods/-Mechanisms	Group work with third-sector entities, Peer and faculty feedback	Open Space Technology methodology; Community feedback; Design brief
Attitudes/Environment created	Cognitive: Collaborative (peer, faculty and communities - where possible) definition of the design challenges; Group project definitions	Cognitive: Students needed to learn about the site from diverse stakeholders from the third-sector contexts
Evaluation and Assessment Mechanisms	Feedback from peer, faculty and stakeholders (where available)	Qualitative assessment through faculty and stakeholders feedback (where available)

Figure 3. Table depicting methods applied in the teaching and learning space to introduce/reinforce the "Positionality" Section of the Schema - Part 2.

BITS Design School, Mumbai, India
- **Faculty** - Lakshmi Srinivasan, Khusboo Jogani, Malay Dhamelia (Author 1, 3 and 4)
- **Guest lecture & Mentoring** by Daniele Busciantella Ricci (Author 2)

Table depicting methods applied in the teaching and learning space to introduce/reinforce the "Methodology Section of the Schema" - PART 1

	Cultural Sensitivity, Contextual Awareness and Real-World Contexts	Systems Thinking (transdisciplinary, interdisciplinary outlooks)	Active and Engaged Learning in the Classroom	Reflective & Critical Practice
Methods Taught In The Studio	Ethnographic Research, Contextual Inquiry, Observation Methods	Systems Mapping, Pedestrian Mapping, Actor-Network Theory, Fishbone Analysis, Time-Motion Analysis	Participatory Action Research (PAR) – Students engage with local communities using fieldwork, interviews, and co-design exercises to understand socio-cultural contexts and collaboratively generate insights.; Research Through Co-Design (Author 2, 2024)	Frameworks for reflections; Journaling
Pedagogical Methods/-Mechanisms	Site Visits, Immersive Fieldwork, Stakeholder Interviews	Expert Panels, Cross-Disciplinary Collaboration, Intersections with Other Fields	Game-Based Learning - Role-playing and data analysis exercises inspired by pop-culture phenomena; Collaborative Studio Critiques and Peer-Led Discussions – Structured design critiques and peer-review sessions are integrated to encourage reflective inquiry, cross-disciplinary collaboration, and co-learning.	Self-Reflection Logs, Critical Reviews of popular design process frameworks, Structured Peer & Faculty Feedback
Assessment & Evaluation	Analysis of field notes; Student reflections on socio-cultural factors	Faculty review of systems mapping outputs; Student identification of connections across disciplines and complexity in systems understanding	Measured engagement through field participation logs, peer reflections, and faculty assessment of participatory contributions in group activities.	Assessment of structured reflections, depth of analysis, and critique quality; Measured through change in student perspectives over time

Figure 4. Table depicting methods applied in the teaching and learning space to introduce/reinforce the "Methodology Section of the Schema" - Part 1.

Table depicting methods applied in the teaching and learning space to introduce/reinforce the "Methodology Section of the Schema" - PART 2

University of Florence, Italy › **Faculty** - Daniele Busciantella Ricci (Author 2) › **Supported by two faculty members (contract professors)** - Marco Berni, Riccardo Luciani	**Cultural Sensitivity, Contextual Awareness and Real-World Contexts**	**Systems Thinking (transdisciplinary, interdisciplinary outlooks)**	**Active and Engaged Learning in the Classroom**	**Reflective & Critical Practice**
Methods Taught In The Studio	Self-reflection process; Personal toolkit co-creation; Secondary data collection	Design-orienting scenario	Collaborative design simulations(Author 2, 2024)	Structured Peer & Faculty Feedback
Pedagogical Methods/-Mechanisms	Immersive experiences; Field observations; Embedded for a day (with the usage of the toolkit); Challenges exploration; Design ethnography	Double Diamond	Co-analysis; Toolkit co-design with peers and faculty; community feedback	Participatory Action Research
Assessment & Evaluation	Community feedback; Design Brief Qualitative assessment through faculty and stakeholders' feedback (where available)	Speculative design principles Theory of Change	Open Space Technology methodology Project exam presentation including all the materials provided throughout the whole course	Meta-design of the process to prepare the final exam Final qualitative assessment for the exam

Figure 5. Table depicting methods applied in the teaching and learning space to introduce/reinforce the "Methodology Section of the Schema" - Part 2.

Table depicting methods applied in the teaching and learning space to introduce/refinforce the "Impact" Section of the Schema - PART 1

BITS Design School, Mumbai, India › **Faculty** - Lakshmi Srinivasan, Khusboo Jogani, Malay Dhamelia (Author 1, 3 and 4) › **Guest lecture & Mentoring** by Daniele Busciantella Ricci (Author 2)	**Education Needs to Drive Praxis**	**Reciprocity of Knowledge, Care and Real-World Application**
Pedagogical Methods/-Mechanisms	ntegrating Design Research into Public Engagement – Students apply participatory research methods (ethnographic observation, stakeholder mapping, and behavioral analysis) to identify systemic challenges in urban public spaces. Findings are synthesized into design frameworks that inform policy, urban planning, and service innovation.	Community-Centered Co-Design – Design interventions are developed in direct collaboration with community members through ... and participatory feedback cycles. The focus is on understanding the problem area with and designing with, rather than for, the community.
Pedagogical Methods/-Mechanisms	Participatory Action Research Mela to make visible to practitioners and academics outside the institution, the field engagements of students (detailed below)	
Pedagogical Methods/-Mechanisms	Student-Led Design – Project outputs extend beyond coursework, are implemented in collaboration with local communities. Eg. urban wayfinding systems, public space redesigns, socially responsible business models.	Knowledge Exchange and Mutual Benefit – Instead of extractive learning, the pedagogical model ensures a reciprocal exchange of knowledge—students gain contextual insights while communities receive ...

Figure 6. Table depicting methods applied in the teaching and learning space to introduce/refinforce the "Impact" Section of the Schema - Part 1.

Table depicting methods applied in the teaching and learning space to introduce/refinforce the "Impact" Section of the Schema - PART 2

University of Florence, Italy › **Faculty** - Daniele Busciantella Ricci (Author 2) › **Supported by two faculty members (contract professors)** - Marco Berni, Riccardo Luciani	**Education Needs to Drive Praxis**	**Reciprocity of Knowledge, Care and Real-World Application**
Pedagogical Methods/-Mechanisms	Transferring service design, co-design and speculative design to cover the basic design knowledge for developing capabilities related to design for social innovation and civic design	Collaborative design education practices (peer-to-peer, and peer-to-faculty) and learning-by-doing approach
Pedagogical Methods/-Mechanisms	Simulating a Double Diamond process	earning-by-doing approach; peer-to-peer learning process; learning through the co-design
Pedagogical Methods/-Mechanisms	Providing embedded experiences in collaboration with third-sector entities to address real-world challenges	Students provide contextual observation insights and the communities provide feedback and design challenges
Assessment & Evaluation	Developing strategic scenarios, service concepts, information and communication prototypes, as well as product-service system concepts	Peer-to-peer collaboration and co-assessment of the conceptual results; students provide feedback about the learning process; faculty provide an assessment of the learnings through the final projects

Figure 7. Table depicting methods applied in the teaching and learning space to introduce/refinforce the "Impact" Section of the Schema - Part 2.

Some salient and unique features of the pedagogy are highlighted through text and images below:

BITS Design School, Mumbai, India

1) Game-Based Approach: A "Halloween Heist" of pop culture Brooklyn-99 fame was organized for a day where students analyzed quantitative and qualitative data sets provided to them from two universes - Harry Potter and Marvel Cinematic Universe. These hypothetical datasets that simulated real-world datasets were analysed and interpreted by students to make effective insight and How Might We statements. As students reported the insight-generation stage to be difficult, this was incorporated to make the process more engaging and light-hearted.

2) PAR Mela: Author 2 visited India to deliver lectures on Research Through Co-Design and mentor students on Participatory Action Research (PAR). A PAR mela (mela is a Hindi word for

carnival) was organized to showcase findings from the field to various design experts from industry and academia to create an added impact of the work done by students. It also provided the students with an opportunity to be mentored by experts.

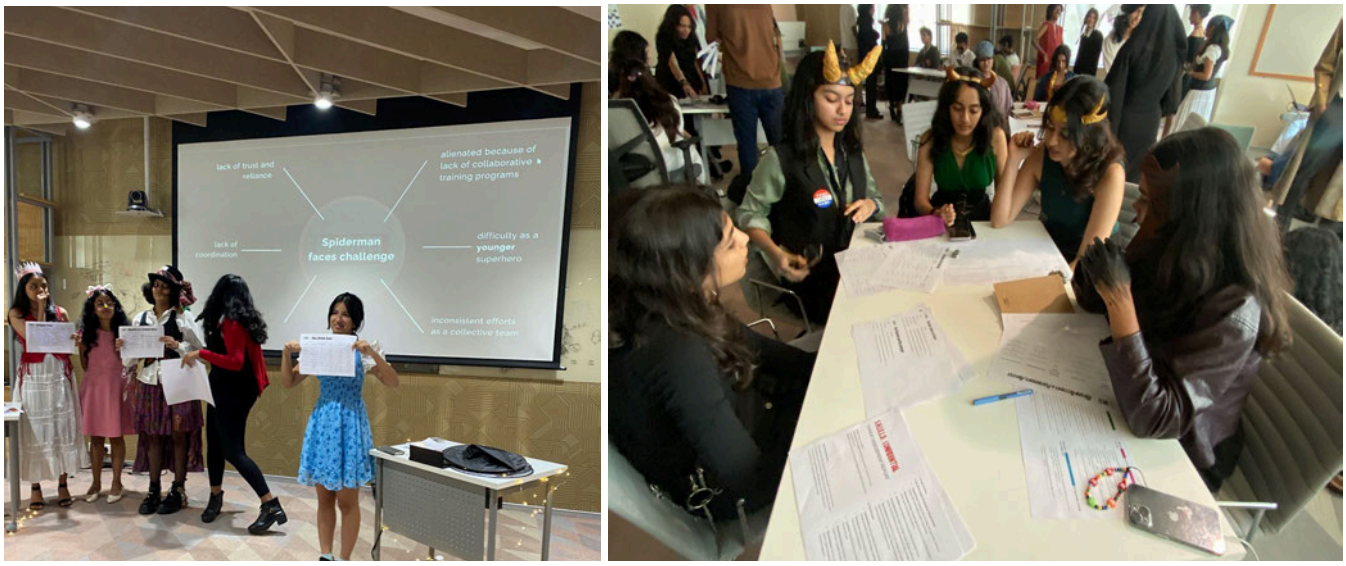


Figure 8: Game-Based Approach – "Halloween Heist" Activity

Students participated in a "Halloween Heist" inspired by Brooklyn Nine-Nine, analyzing hypothetical datasets from the Harry Potter and Marvel Cinematic Universe.

Figure 9: PAR Mela – Participatory Action Research Showcase

The Participatory Action Research (PAR) Mela provided a platform for students to present their research findings to industry and academic experts.

University of Florence, Italy

1) Immersive experiences

Five immersive experiences were organized in collaboration with local third-sector entities. Students actively participated in creating conditions for exploring the contexts using design toolkits they developed themselves, which were iteratively assessed by faculty members and through peer-to-peer review. Additionally, collaborative activities were carried out during the immersive experiences to collect data for defining the design challenges.

2) Open Space Technology

The Open Space Technology (OST) technique was applied after the immersive experiences to collaboratively define: (i) design challenges, (ii) student groups engaged in each challenge, and (iii) specific themes to be addressed by each group. These design challenges guided students in developing their final design concepts and project work, which formed the basis for their final exam materials. The OST approach was a crucial activity in democratically defining challenges by considering the needs and issues of the explored contexts while also organizing student groups based on their individual skills and interests.

Figure 10. Students engaged in the two different immersive experiences, a local urban regeneration project based on cultural welfare (on the left), and a co-housing for social inclusion (on the right).

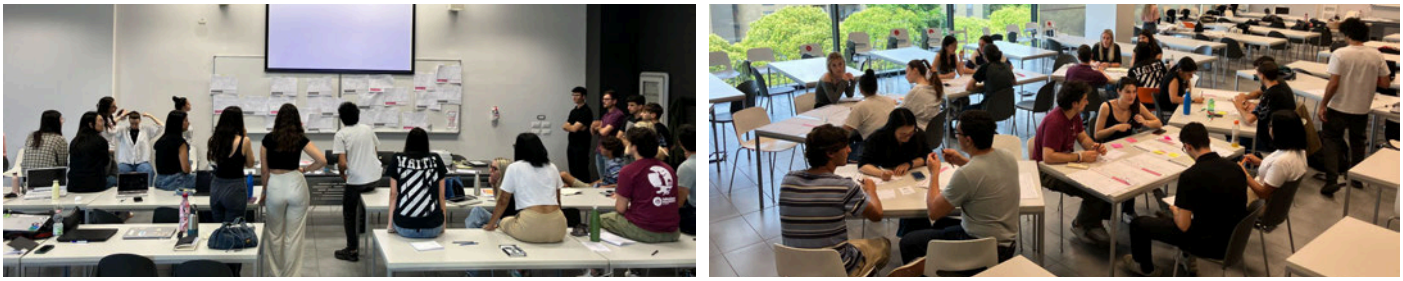


Figure 11. Students engaged in the two key collaborative activities during the OST.

Results & Discussion

Measuring Pedagogical Impact, Mumbai, India

Quantitative Analysis

A quantitative analysis was conducted to understand how various aspects of the schema were visible in student works.

1) With respect to the first two components of the schema, Collaborative, Designer-Uncentered Approach (democratic inquiry) and Attitudes of Care, Inclusiveness and Equity, PAR methods, including semi-structured interviews, and participatory toolkits were employed. Research Through Codesign was employed through speculative scenario-building and mapping exercises.

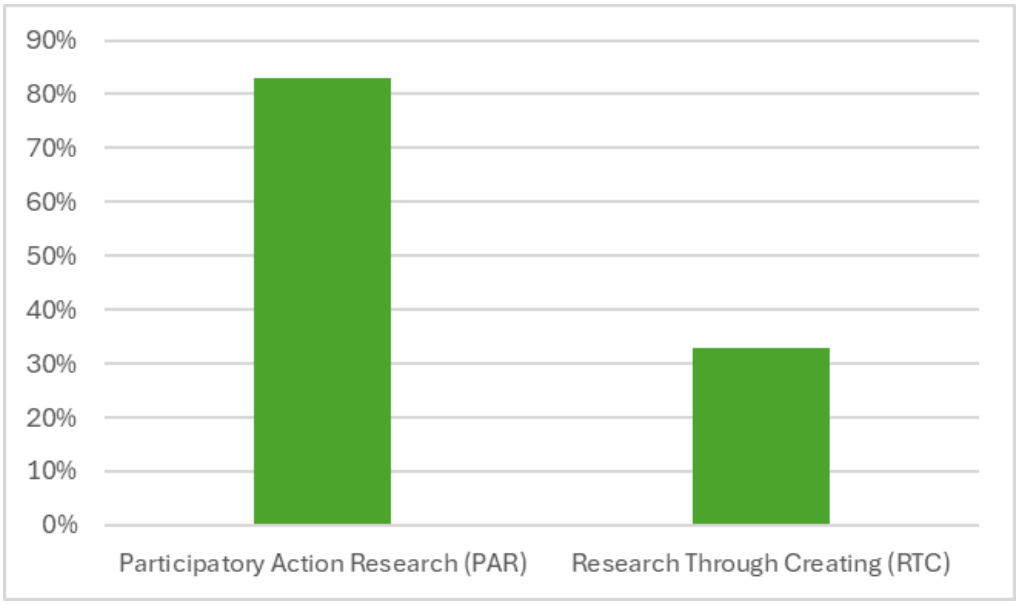


Figure 12. Chart depicting percentages of students employing PAR and RTC in Institution, Mumbai, India

2) To operationalize the third aspect of the schema—"Cultural Sensitivity, Contextual Awareness, and Real-World Application"—the pedagogical approach involved curating site selections based on six distinct thematic categories. These categories were strategically chosen to expose students to diverse socio-economic, cultural, and spatial dynamics, ensuring a comprehensive understanding of design in real-world contexts. The six thematic site classifications were:
    1. Urban Public Spaces & Transit Hubs
    2. Commercial & Informal Business Spaces
    3. Institutional & Educational Environments
    4. Community Spaces
    5. Recreational & Leisure Spaces
    6. Service-Oriented & Repair Economies

By engaging with these varied spatial typologies, students developed a nuanced awareness of place-based design, fostering an appreciation for contextually responsive and socially embedded design practices.

3) The interdisciplinary modes of working along with systems' thinking was visible through various methods students chose to employ from what was introduced to them. Fig.13. depicts the various disciplines students engaged in.
4) With respect to the aspect of the schema, "Active and Engaged Learning in the Classroom", various active learning strategies were employed. Fig.14. gives a detailed breakdown of class hours spent on different strategies.
5) In the subsequent module, all student groups carried their interventions to the site, ensuring a 100% translation of classroom learning into real-world application. This approach reinforced the principles of Education to Drive Industry and Reciprocity of

Knowledge, Care, and Applicability to the Real World, demonstrating the tangible impact of design research when directly engaged with stakeholders.

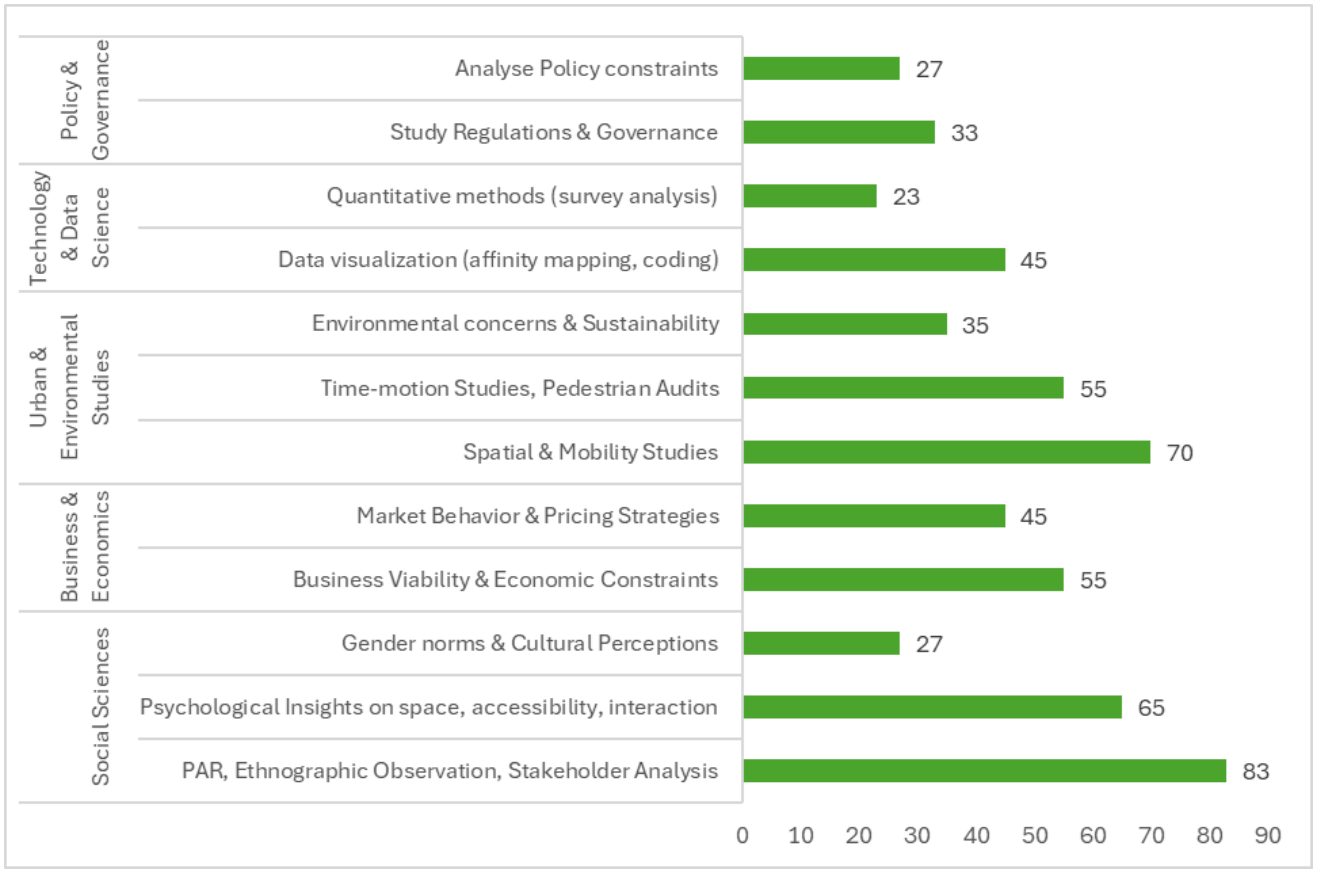


Figure 13. Image depicting percentages of students engaged with other disciplinary perspectives

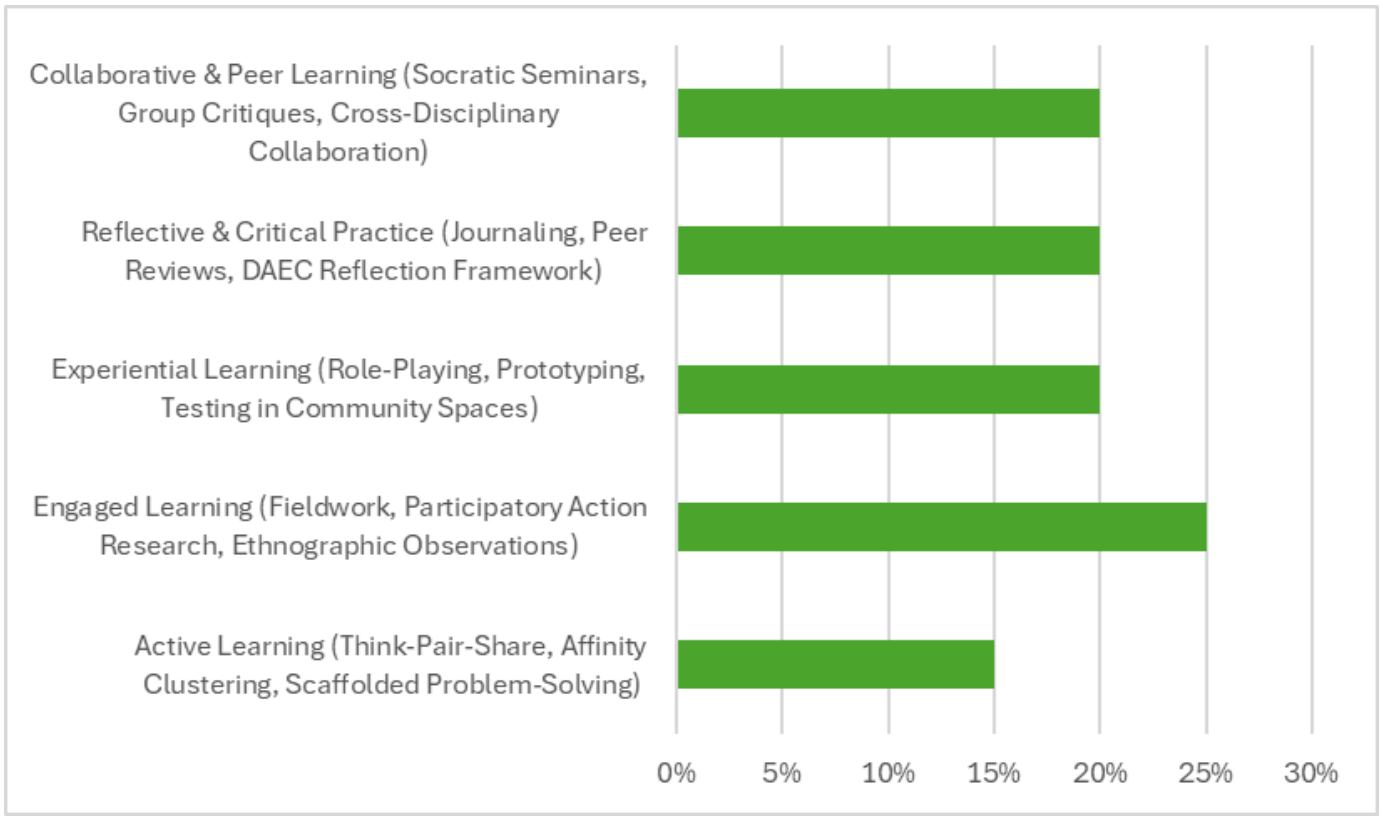


Figure 14. Breakdown of class hours spent on different types of active learning strategies

Qualitative Analysis

We refer to three case studies of student work here to further demonstrate the pedagogical impact as a way of "interpreting meaning within context" (Krippendorff, 2018).

Case Study 1: Waste Collectors' of "Lucky" Street

In Mumbai's urban streets, informal waste collectors and sweepers play a vital role yet face systemic neglect in welfare, safety, and recognition. This project addressed inequities such as unsafe conditions and stigmatization, alongside hazardous waste disposal behaviors. Initially, students viewed improper waste disposers as culprits, but immersive interviews and participatory action research (PAR) revealed deeper systemic causes, profoundly shifting their understanding of street users.

Findings and Insights listed by students:

- The design of the current dustbins required pedestrians to touch the lid and get themselves dirty in order to dispose of waste. Users of the street needed to dispose of waste conveniently without getting dirty.
- Waste collectors and street sweepers faced health risks due to inadequate protective gear and unsafe collection practices.
- Cigarette smokers needed special and convenient disposal systems for cigarette butts. The site lacked this.

This case underscores the importance of ethical reflexivity, as students critically examined their role in advocating for systemic change while respecting community agency. They also recognised design as an embedded mechanism within a larger system encompassing various government bodies, stakeholders and urban ecosystems. Waste collectors' dignity and safer working conditions were prioritized.

Case Study 2: Bus Ridership Challenges and Impacted Urban Mobility

This project investigated declining bus ridership and its impact on vulnerable users, analyzing ridership data, infrastructure gaps, and stakeholder behaviors to identify barriers. Employing mixed methods, students conducted vehicular audits to locate congestion points, interviewed senior citizens about travel challenges, and used quantitative rider counts to reveal usage patterns across demographics including mothers, office workers, and seniors.

Findings and Insights listed by students:

- Travelling in a bus for a senior citizen can be a challenge because the bus infrastructure and vehicles are not built with their physical limitations in mind.
- Accessing toilets in case of emergencies is a challenge for diabetic bus users as it is difficult to locate toilets quickly en route.
- Night-time journeys are a challenge for women because there is limited activity on the street, and intoxicated people, and it is not well-lit.
- Commuting is a challenge for a daily worker because they have limited transit options that are punctual and affordable.

- Knowing what bus to take is a challenge for people as route information is not prominent and accessible.

This project exemplifies the pillars of systems thinking and interdisciplinary problem-solving, with students integrating social, and infrastructural considerations into actionable insights.

Figure 15. Case Study 1 -Students Anjali Lodha and Prisha Modi of BITS Design School, Mumbai conducting interviews and PAR with street sweepers and waste collectors.

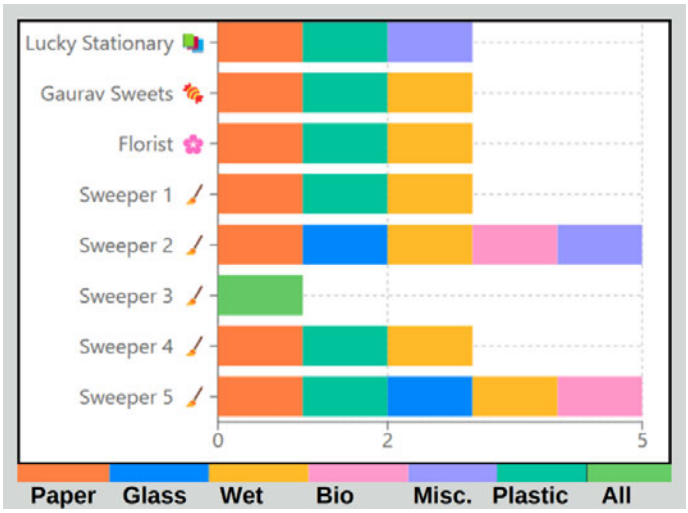
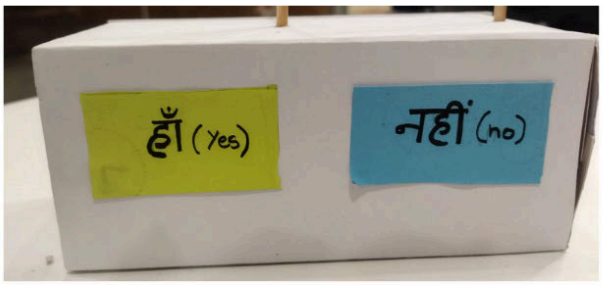


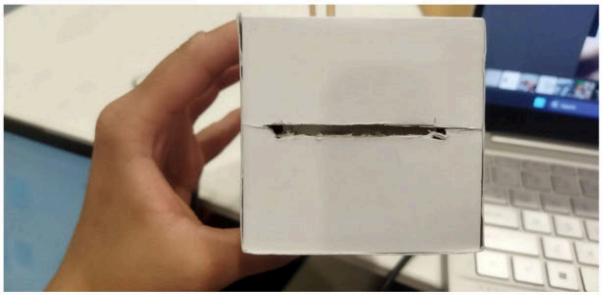
Figure 16. Case Study 1 - Student mapping of types of waste generated by different shops and the different sweepers whose daily work is impacted by the same. Student work submitted by Dhiren N,

Prisha Modi, Anjali Lodha, Srivaishnavi Lakkaraju, Siddhi Joshi

These are our cue cards colour coded and marked differently for easy identification of our quantitative data.
Blue are aspects on the bus and **pink** are aspects on the bus stop.



The toolkit has two segregations, Yes and no. If a personal has a problem with an aspect they put it in yes and if not then no.



We also added a slit for additional feedback and qualitative data which is not mentioned on the cards. This gave us unexpected and different types of opinions.

Figure 17. Case Study 2 - Participatory toolkit designed to analyse infrastructural issues that impacted bus ridership. Student work submitted by Sharanya Mukherjee, Simona Das, Sara Tripathi, Kujal verma, Harshit Jaiswal, Aarushi Pranavi, Dhruv Srinivas, BITS Design School.

Case Study 3: Investigating Kirana Stores

This research examined daily operations of Kirana stores—small, family-owned retailers vital to local supply chains—focusing on inventory management and data tracking amid a changing retail environment. Students employed systems mapping, time-motion analysis, stakeholder interviews, ethnographic observation, and participatory toolkits to explore decision-making, financial practices, and technology use in depth.

Findings and Insights listed by students:

- Maintenance of the Khaatas is tedious for the store owner due to keeping multiple copies of them in the form of pdfs. This redundant process leads to confusion and discrepancies in data.
- Cluttered placements of products lead to low product visibility leading to reduced impulse purchases.

The findings highlighted both challenges and opportunities for enhancing efficiency and resilience within these micro-enterprises. This study was a prime example of systems thinking that incorporated interdisciplinary understandings where design thinking intersected with finance and project management.

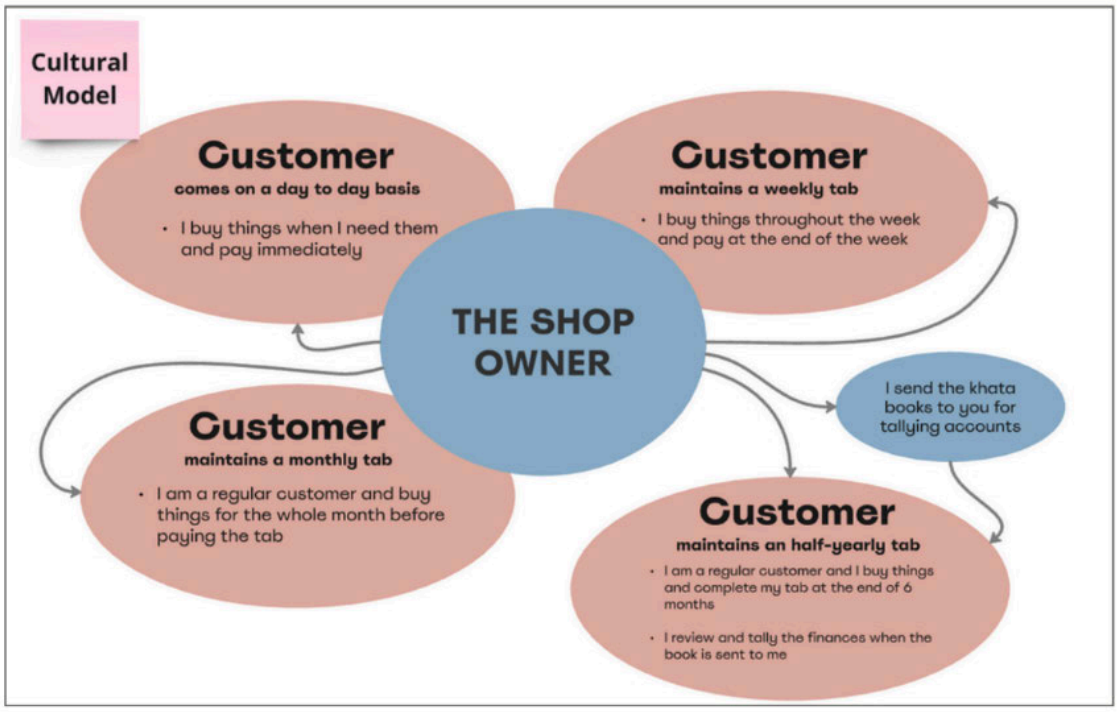


Figure 18. Case Study 3 - A Cultural model showing relations and exchanges made between different types of customers and the store owner that constitute the current system of Khatta-keeping. Student work submitted by Arya, Purvi, Siya, Aneesh, Arnav, Riddhi, Sakshi, BITS Design School

These case studies highlight participatory research's transformative potential in overcoming systemic barriers, emphasizing cultural sensitivity, interdisciplinary problem-solving, and ethical reflexivity. They validate the applied framework by showing how tools like stakeholder mapping and narrative inquiry yield actionable, community-centered solutions. For communities, the projects fostered empowerment and advocacy; for students, they reinforced critical reflection and developed participatory research skills alongside holistic socio-economic understanding.

Table 1. Table depicting incorporation of schema in student projects case studies for Mumbai, India

Observation from Student Work	**Insight wrt Pedagogy**	**Relevance to Schema**
Waste Collectors' of "Lucky" Street		
Student project on waste collectors considered multiple stakeholders' perspectives and analysed it from different lenses.	A combination of contextual immersion mixed with behavioural study and deliberate stakeholder mapping proved effective in this case to make students consider multiple perspectives.	Collaborative, Designer-Uncentered Approach (Democratic Inquiry)

Students' initial assumptions about stakeholders (users of the street) dramatically changed after PAR.	PAR helped students develop greater nuance and cultural sensitivity towards the real-world context they were investigating.	Cultural Sensitivity, Contextual Awareness and Real-World Contexts
Students focused on the most vulnerable and least powerful stakeholder on their site - the waste pickers. They focused their design brief around the waste pickers.	Relevant Methods Taught: Interviews, Stakeholder Maps Explanation: The conversations while making stakeholder maps to mark stakeholder relationships and to evaluate most and least excluded paid off.	a) Attitudes of Care, Inclusiveness and Equity b) Reflective & Critical Practice (Awareness of Existing Power Dynamics and One's Own Process)
Bus Ridership Challenges and Impacted Urban Mobility		
Students employed a combination of different methods to uncover detailed patterns, issues and specific stakeholder needs.	Incorporation of quantitative methods that emphasize systemic understanding and ethnographic methods that encourage empathy with stakeholders can created nuanced and effective contextual immersion and insight generation	a) Contextual Awareness and Real-World Contexts b) Attitudes of Care, Inclusiveness and Equity c) Systems Thinking with transdisciplinary and interdisciplinary outlooks
Investigating Kirana Stores		
Students employed systems' mapping, time-motion analysis to understand store owners' working patterns and provided tech support for financial management.	The nature of the context provided provoked students to employ systems thinking tools and interdisciplinary techniques.	a) Contextual Awareness and Real-World Contexts b) Systems Thinking with transdisciplinary and interdisciplinary outlooks

Analysis of Reflective Journals

Maio & Haddock (2009, p. 28-30) highlight open-ended self-assessment methods, such as reflective journals and belief listing, as effective tools for measuring attitudinal shifts. Applying these qualitative assessment models in design education can help evaluate whether students have internalized ethical design principles. The following quotes from student reflections submitted at the end of the module illustrate this,

Sampoorna Krishna wrote “From viewing our street as just grounds for business, conducting the participatory activities and conducting interviews gave our project’s narrative a parallel storyline of Hope. Awadh uncle, a vendor, spoke to us at length about his life, livelihood and how he does what he does so his children can get a good education and have a good life. Conversing with many stakeholders like this breathed life into our experience of research.”
Siddhi Joshi wrote “Working on this project made me realize how a simple street we often walk on can be seen as a complex site of interaction. For instance, I discovered that sweepers feel emotionally supported when we address their concerns about extra work or injuries from sharp objects during the waste collection process.”
Prisha Modi wrote “I learnt that the whole design research process required no assumptions, biases, and an insight into the different perspectives of different stakeholders to finally gain a problem statement that we can then work on..”
These excerpts also demonstrate how the pedagogy was impactful with respect to incorporating a critical part of the schema “Reflective & Critical Practice (Awareness of Existing Power Dynamics and One’s Own Process)”.

Measuring Pedagogical Impact, Florence, Italy

It is possible to frame results and outcomes - as short and mid-term impact conditions - directly observable from the education experience in Italy. First, students provided several kinds of outputs related to their design studies and processes such as

- 7 design scenario;
- 24 design toolkits (at least one for each student);
- 231 design tools filled throughout the whole course;
- 7 projects (including service and strategic design concepts) that addressed the design challenges discussed in collaboration with the entities that determined the immersive experiences

Second, in terms of the mid-term impacts of the course, students activated three internships on the same topics and one went into a thesis project with the same topics and learnt approaches.
Third, the initial experience in the course provided data that were co-analysed in collaboration with the faculty who taught the course. This analysis aimed to improve the course and develop a revised version for the next academic year. The main insight was that the students were well-prepared in terms of methodologies and process awareness. However, the quality of the final exams needs improvement, particularly in refining details that can enhance the evidence for impactful design ideas. The faculty team is working on strategies to address this gap.

Conclusion

The outcomes from the module conducted in India demonstrate rich, nuanced understandings in student work. Additionally, when the schema was incorporated into the pedagogy through the right methodology, environment and behavioural conditions, most students responded to their contexts with sensitivity and developed a sense of humility and appreciation for the local

communities. This was witnessed through student reflective notes and essays. The case study of the student work in India also highlights the importance of integrating interdisciplinary and transdisciplinary methodologies coupled with tools for systems thinking in the classroom (as outlined in the schema) to enable students to develop holistic, designer un-centered approaches to real world contexts. The case study also demonstrates that while reflective praxis and reflective writing can be perceived as cumbersome by students, consistently engaging in reflective thinking can both enhance quality of work and increase students' cultural sensitivity.

The educational outcomes from the Italy module reveal a tangible and multifaceted impact on students in both immediate and mid-term contexts. The creation of design artefacts—such as scenarios, toolkits, and tools—and the development of real-world projects with external partners demonstrate deep student engagement. Continued learning through internships and thesis work further reflects the course's sustained relevance. Faculty-led analysis of course data has yielded critical insights for curricular refinement. While students exhibit strong methodological grounding and process understanding, their final outputs indicate a need for improved clarity and communication. Faculty efforts to address this gap highlight a reflective and evolving pedagogical approach that seeks to enhance both academic rigour and real-world impact.

Both case studies, thus, effectively demonstrate mechanisms through which the schema can be applied in social design pedagogy. Additionally, they also illustrate through experimentation and the above results, the effectiveness of the schema in delivering what it proposes.

Way Forward

Building on our analysis of student case studies, future iterations of this pedagogical approach will focus on refining strategies for deeper engagement with industry and community stakeholders. Emphasizing reciprocity, we aim to strengthen knowledge exchange between academia and practice, ensuring that educational frameworks remain responsive to evolving socio-economic and environmental challenges. Further research will explore scalable models for interdisciplinary and transdisciplinary collaboration, fostering more inclusive and equitable learning environments. Additionally, longitudinal studies will assess the sustained impact of this pedagogy on students' professional trajectories and critical thinking capacities. By integrating continuous reflection and adaptability, we seek to enhance the transformative potential of design education in addressing real-world complexities.

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DESIGN EMPOWERMENT: PARTICIPATORY GOVERNANCE IN RENEWABLE ENERGY INFRASTRUCTURE PLANNING.

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ABSTRACT | The quest for global net-zero emissions has become a fundamental objective, underpinned by the expansion of renewable energy networks. However, the implementation of these infrastructures presents considerable challenges, as they inevitably alter landscapes and disrupt local communities (Esposito et al, 2023; Light, 2021). This paper delves into the case of the proposed electric interconnector between Normandy(France) and Portsmouth(UK). The proposed development has exacerbated disputes among Portsmouth ' s community, the Aquind Limited, and governmental authorities, reflecting a broader clash between national energy strategies and regional needs (Kerridge et al, 2023; Martin et al, 2023). While traditional top-down communication

methods facilitate basic information exchange between stakeholders, miscommunication and entrenched positions continue to hinder consensus on balancing escalating energy demands with the preservation of community identity and environmental integrity. By applying Arnstein ' s "Ladder of Citizen Participation" theoretical framework, the "Pillow Bomb" workshop facilitates dialogue between Portsmouth residents, Aquind Limited, and government representatives. (Arnstein, 1969, p.216-224) This dialogue reveals misunderstandings and latent desires that often underlie conflicting viewpoints. The process underscores the critical role of public participation and democratic deliberation in decision-making, while also promoting equitable solutions in energy infrastructure planning to achieve social justice. The governance-led design approach plays a key role in this process by creating inclusive and transparent platforms for dialogue, encouraging deeper understanding and mutual comprehension among stakeholders (Tsekleves et al., 2022; Liu, 2024; Hoffman, 2022). It empowers local communities and residents, giving them a more active role and greater influence over political decisions that directly affect their lives (Dabaghi, 2024, p.452-469; Manzini, 2014, p.57-66; Schneider, 2020). This study demonstrates the potential of participatory governance to bridge communication gaps and promote more inclusive, equitable energy infrastructure planning. It highlights the contradictions between national energy goals and local environmental priorities, offering an innovative pathway for advancing social justice in the context of the sustainable energy transition. Through fostering community-driven planning processes, the research paves the way for solutions that balance the needs of local communities with long-term environmental stewardship and civil rights.

KEYWORDS | PARTICIPATORY GOVERNANCE, GOVERNANCE-LED DESIGN, PUBLIC DESIGN, COMMUNITY PRACTICE, STAKEHOLDERS

1. Introduction

“The global transition toward net-zero emissions has driven the rapid development of renewable energy infrastructures; however, their deployment often sparks conflicts at the local level”. (Esposito, et al, 2023, p.259-273; Light, 2021, p.102855) While these projects are crucial for achieving sustainability, they frequently disrupt landscapes and impact communities, creating tensions between developers, governments, and local residents. A notable example of such tensions is the proposed electric interconnector project(AQUIND) between Normandy, France, and Portsmouth, UK. Aquind Limited’s proposal outlined plans to: “Install cables designed to transmit 2 million watts of electricity beneath Eastney Beach, and to construct trenches and tunnels from the landing site, extending from south to north, to connect the cables to the National Grid at Lovedean” (Aquind Limited, 2023). This would

enable the flow of electricity between Europe and the UK. “However, the construction of this project threatens to cause several months of power disruptions and extensive damage to the city's infrastructure along the route”. (Portsmouth City Council, 2023) Long-buried toxic materials in landfill sites could be unearthed, further harming an already congested and environmentally stressed city. The author noted that “Although the project holds national significance, local opposition in Portsmouth has been fueled by concerns about environmental degradation and a perceived lack of transparency in the decision-making process“ (Author, 2023). These concerns were exacerbated by a sense of inadequate consultation, which left local communities feeling marginalized and excluded from the planning process. In response, local residents formed a grassroots community group, Let’s Stop Aquind (LSA), organizing various protests, submitting petitions, and leveraging media platforms to amplify their objections. Some artists and designers actively engaged with the cause, utilizing design tools and visual media to express their views, spark public discussion, and mobilize action. “Activities included crafting protest messages through Craftivism, carrying protest posters along the proposed interconnector route, painting rocks within the community and hiding them along the interconnector path in Portsmouth, and digitally projecting a film about political donations made by Aquind Limited directors to Conservative MPs onto the hull in Portsmouth dockyard.” (Let’s Stop Aquind, 2021) “Through these creative art and design interventions, artists and designers transformed abstract political concerns into tangible, collective expressions of resistance.” (Licaj, 2023, p.450-467) By fostering inclusive and accessible forms of activism, they empowered community members to articulate perspectives, ultimately amplifying the impact of their actions in the public sphere.

Figure 1. Spontaneous Poster Protests by Local Residents (left) and Craftivism in Response to the Aquind Interconnector (right).

The tensions between Aquind’s national-scale project and local residents’ environmental priorities underscore the need for a more participatory approach to governance in renewable energy infrastructure planning. This practice-based research project, undertaken as part of the STOP-AQUIND initiative (carried out from March 3, 2022, to December 1, 2023), critically examines the limitations of traditional stakeholder communication and advocates for innovative, design-driven interventions that foster inclusive dialogue and meaningful community engagement. By introducing the speculative design concept "Pillow Bomb" as a tool for collaborative discourse, this paper presents a novel pathway for embedding design justice within the energy transition. It argues that participatory governance can bridge the gap between national energy strategies and local concerns, fostering more equitable, transparent, and resilient planning processes. This approach empowers communities, ensuring their sustained involvement in shaping energy infrastructure development.

2. Literature Review

"The term 'governance' originally emerged as a social science concept and was first introduced by the ancient Greek philosopher Plato, meaning 'to guide and manage the people'." (Wanjiru, 2022) Peters explained that "If conceptualized correctly, governance can form the foundation of an important political theory, focusing more explicitly on how the public sector provides guidance and control for society and the economy, thus addressing a range of contemporary issues in both academia and the real world" (Peters, 2011, p.63-72). Levi-Faur argued that "Participatory governance is a variant or subset of governance theory that emphasizes democratic participation, particularly through deliberative practices, with the aim of deepening citizens' engagement in government processes by critically examining the assumptions and practices of traditional perspectives" (Levi-Faur, 2012, p.457-471). "A pivotal framework for understanding participatory governance is Arnstein's Ladder of Citizen Participation, which categorizes citizen involvement into eight hierarchical levels, ranging from manipulation (the lowest) to citizen control (the highest)." (Arnstein, 1969, p.216-224)(See Figure 1) These levels are grouped into three categories: non-participation, tokenism, and citizen power. Non-participation (e.g., Manipulation and Therapy) reflects instances where the intention is merely to educate or cure participants, rather than genuinely involving them. Tokenism (e.g., Informing, Consultation, and Placation) allows citizens to hear and be heard but limits their power to influence decisions. True citizen power (e.g., Partnership, Delegation, and Citizen Control), on the other hand, represents meaningful participation where citizens actively shape policies and decisions. To conclude, participatory governance emphasizes democratic engagement through deliberative practices, aiming to deepen citizens' involvement in governmental processes. Arnstein's Ladder of Citizen Participation serves as a key framework to evaluate the effectiveness of such governance, highlighting the importance of advancing from tokenism to genuine citizen empowerment.

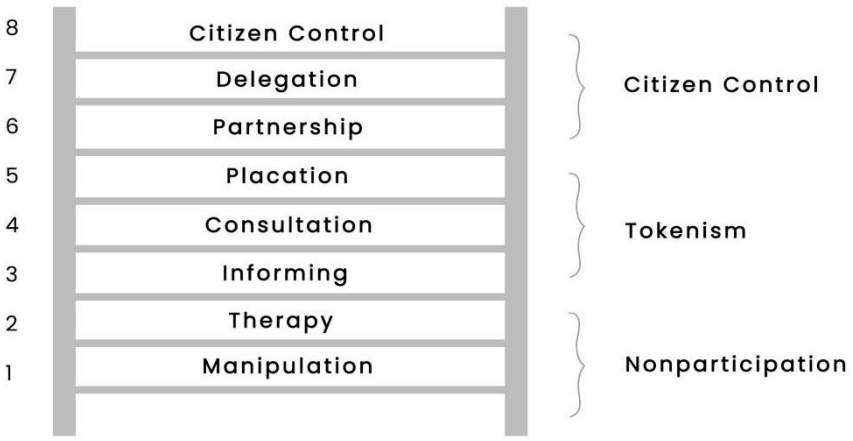

Figure 1. Arnstein's Ladder (1969) Degrees of Citizen Participation.

As scholars turn their attention to the role and nature of participatory governance, increasing evidence shows that its implementation enhances efforts to improve democracy, social welfare, and national quality. Monterroza-Rios et al's research on community design in Colombia demonstrated that "Participatory governance increases residents' sense of collective belonging" (Monterroza-Rios, et al, 2024, p.1-16). Arnstein's framework would prompt a deeper examination of whether this participation lies within the realms of tokenism or genuine citizen power. "Similarly, UNIDO's report on participatory policy-making emphasizes the integration of local knowledge and mutual learning between citizens and policymakers, but the ladder underscores the importance of ensuring such practices transcend tokenistic levels and achieve higher rungs of active

citizen power." (Rodriguez & Komendantova, 2022) "By applying Arnstein's framework, researchers and practitioners can critically assess participatory governance practices, ensuring that they foster inclusive decision-making processes that genuinely empower citizens." (Donaghy, 2011, p.83-102; Martin, et al, 2023, p.80-91) The above research indicates that Arnstein's Ladder of Citizen Participation provides a critical framework for evaluating these practices, underscoring the need to move beyond tokenism and toward genuine citizen empowerment.

In governance theory, Governance-Led Design (GLD) primarily focuses on the strategic involvement of various stakeholders in addressing and solving contemporary social, technological, and cultural challenges through design. "By framing governance as a collaborative and participatory process, GLD invites a critical exploration of future possibilities, ensuring that governance mechanisms are more inclusive, transparent, and adaptive." (Dunne & Raby, 2024) Scholars increasingly combine regional contexts and real-life examples to investigate the practical applications of GLD, gaining a deeper understanding of its potential to foster effective and positive social change. Şahin & Turan, in their study of policy-making practices in Turkey, emphasized "The importance of leveraging local autonomy to bridge the gap between citizens and administrative bodies" (Şahin & Turan, 2022, p.427-443). This process, powered by GLD, promotes a dynamic model for decision-making, which alleviates conflicts caused by information asymmetry and facilitates sustainable, multi-possibility spaces for policy innovation. Similarly, Lanng et al in Denmark found that "The intersection of citizen action and policy-making in rural areas highlights the increasing role of design in fostering effective citizen engagement and policy-making" (Lanng, et al, 2022, p.86-102). This interaction allows for more comprehensive policy development by incorporating community feedback and engaging citizens in the decision-making process, ultimately improving the effectiveness and fairness of policies.

It is evident that GLD plays a crucial role in policy-making by improving decision-making quality, offering innovative solutions, and ensuring that policies are forward-thinking, efficient, inclusive, and feasible. In turn, this fosters progress in both public governance and social development. For instance, in the "Social Studio" project in Scotland, Broadley & Dixon (2022, p.444-465) pointed out "Participatory policy design not only addresses the needs and values of the public but also leverages a broader range of expertise and resources". "The Scottish Parliament fosters a 'safe space' for public engagement by utilizing 'mini-publics', which are composed of randomly selected citizens, thereby enhancing the participatory and deliberative quality of policymaking." (Escobar & Elstub, 2017) McGillivray et al demonstrated that "Participatory design processes, such as design competitions and public exhibitions, foster wider social involvement, improving decision-making and the inclusivity of public spaces" (McGillivray, et al, 2023, p.1-18). Additionally, Mariotti et al's focus group research in Kuala Lumpur reinforced that "Involving future residents in housing design processes strengthens understanding of their needs, contributing to better urban planning" (Mariotti, et al, 2023, p.624-640). Overall, GLD offers a transformative approach to governance by actively involving diverse stakeholders in shaping societal futures. This approach enhances democratic participation, enabling citizens to critically assess and construct more inclusive and sustainable policy implementation methods.

3. Methodology

This study is conducted within the broader context of the NON-AQUIND practice research project, in collaboration with other researchers. It employs a combination of field observation, participatory methods, semi-structured interviews, and the stakeholder

communication dynamics. These methods are designed to examine the underlying causes of conflicts between national energy objectives and local environmental concerns while also addressing the challenges of achieving stakeholder consensus.

3.1. Field Observation

Dabaghi claimed that "Field Observation enables researchers to collect data in the natural environment where the product or service will be used, allowing for a more accurate understanding of real-world contexts and user behaviours" (Dabaghi, 2024, p.452-469). This approach provides insights into how users interact with designs in situ, rather than in artificial or controlled settings, ensuring that the design decisions are rooted in actual use cases. In order to gain a comprehensive understanding of the potential impact of the proposed Aquind electricity interconnector, this study conducted a site visit to key locations along the planned cable route in the Portsmouth area. "The selected locations include Eastney & Milton Allotments Association, Thatched House, Langstone Harbour Fishermen's Association, Fort Cumberland Open Space Car Park, Eastney Naturist Beach, and The People's Memorial." (Stop Aquind, 2022) These areas were chosen for their distinct land use and significance to local communities, as they reflect both residential and the lives of local residents that could be affected by the interconnector's installation.

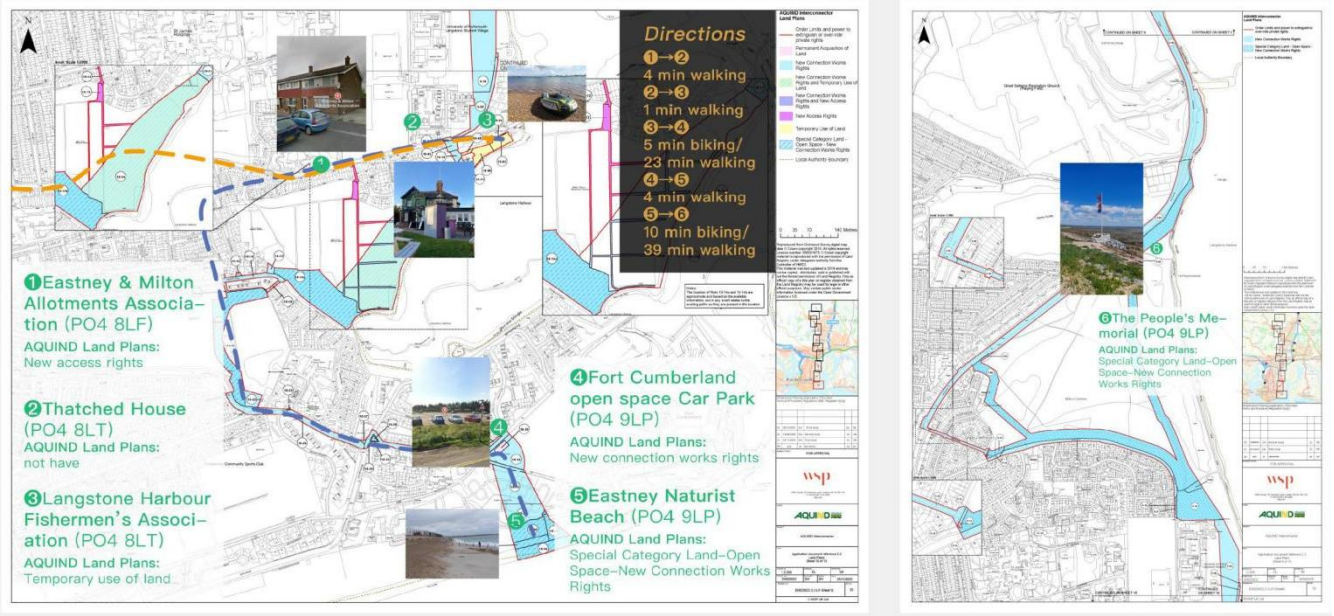

Figure 2. The Map of Key Landmarks Along the Aquind Interconector Land Plans in Portsmouth.

A detailed map was created to illustrate the proposed route of the Aquind cable and to mark its proximity to these locations(See Figure 2). The Eastney & Milton Allotments Association is designated with new access rights under the AQUIND Land Plans, emphasizing its connectivity within the community via walking and biking routes. The Thatched House remains unaffected by any proposed interventions. In contrast, the Langstone Harbour Fishermen ' s Association is marked for temporary land use, likely serving operational needs during project activities. The Fort Cumberland Open Space Car Parkis identified as a strategic site for new connection works, while the Eastney Naturist Beach and The People's Memorial, both classified as "Special Category Land-Open Space," are allocated new connection work rights. The land-use characteristics of these areas include urban allotments, heritage sites, recreational spaces, and leisure zones, which are likely to experience significant changes if the project proceeds. By surveying these areas, the research aims to assess the potential conflicts between the proposed development and the local community ' s concerns about land usage, environmental impact, and the preservation of community spaces.

3.2. Participatory methods & Semi-structured interviews

To better understand the concerns and resistance of Portsmouth residents regarding the proposed Aquind interconnector project, both participatory methods and semi-structured interviews were employed in this study. “These approaches allowed for a comprehensive, context-sensitive exploration of the local environment and its socio-cultural fabric, providing a nuanced understanding of the community ’ s perspectives.” (Manzini, 2014, p.57-66) Through participatory research, a multi-sensory and immersive field methodology was applied to explore key areas in Portsmouth. “This approach visually captured the interactions between ecological landscapes and built environments.” (Schepers, et al, 2013, p.281) Various participatory techniques were used, including Pattern (identifying characteristic textures reflecting local environmental and cultural identities), Haptic (physical interaction with local materials such as beach rocks to deepen sensory connection with the area), Transportation (experiencing different modes of transport to gain contrasting spatial insights), and Record (collecting local materials and documenting auditory features of affected spaces)(See Figure 3). The researcher extracted key elements from five locations along the Aquind electricity interconnector (shown in Figure 2) and combined them with landscape features (e.g., carrots from local vegetable gardens, streetlights) and natural elements (e.g., swans, sea grasses) corresponding to each area. These elements, collected through participatory methods, were integrated to create a spatial map that visually represented the local environment.

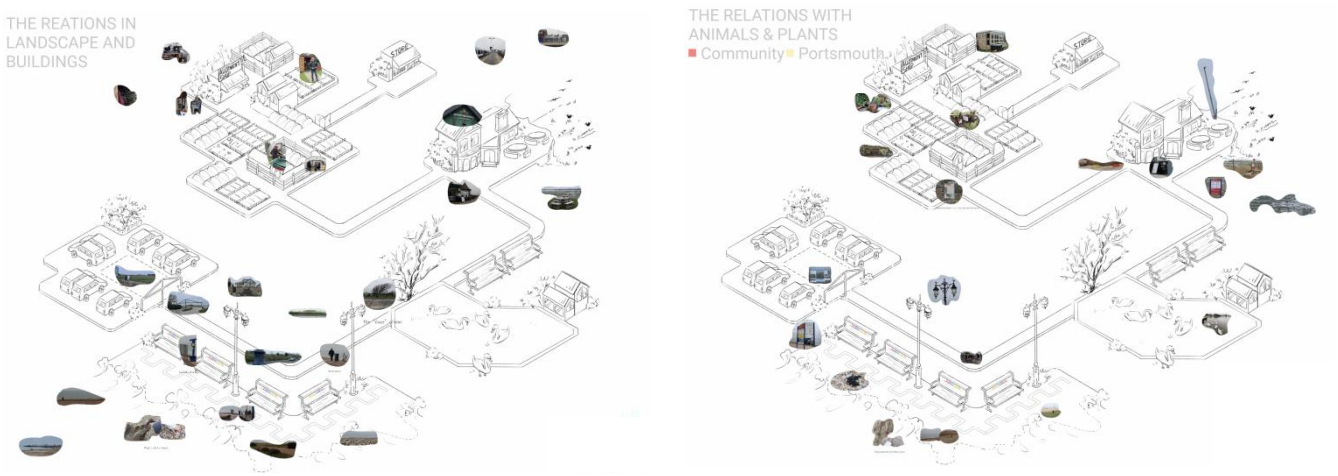

Figure 3. The Spatial Mapping Between Ecological Landscapes and Built Environments in Portsmouth.

In parallel, semi-structured interviews were conducted with 24 Portsmouth residents — selected to reflect a diverse cross-section of the local population directly affected by the proposed development. The sample included long-term homeowners, younger renters, and individuals from both urban and suburban areas. Several participants had actively taken part in public hearings or community protests against the project, while others expressed concern but had not previously engaged in any formal opposition. Interviews were also conducted with representatives from Aquind Limited and local government bodies to gain a broader perspective on the conflicts surrounding the project. These interviews, which lasted 30-45 minutes each, featured open-ended questions and focused on the key reasons behind the community ’ s resistance(See Table 1). Data collected through audio recordings and supplementary notes revealed that poor communication between the government and residents (40%) was a primary concern, followed by environmental disruption (32%), energy concerns (20%), and intergenerational differences (8%). Thematic analysis of the interviews highlighted that residents felt excluded from meaningful dialogue and were particularly worried about the potential destruction of

Portsmouth ' s historic and cultural heritage, loss of biodiversity, and the visual and infrastructural impacts of the Aquind interconnector project. The residents emphasized the need for transparent communication beyond traditional media channels, noting that their concerns were exacerbated by a perceived disregard for their civic rights. "Combining these participatory methods with insights from the interviews provides a solid, contextually grounded approach to understanding local resistance and concerns about the project, and lays the foundation for a more inclusive and transparent model of participatory public governance." (Huybrechts, et al, 2020, p.3-16)

Table 1. Causes of Conflict in the Aquind Interconnector Project: Summary of Semi-Structured Interviews.

Aspect	Details	Insights
Objective	To explore the reasons behind conflicts between Portsmouth residents, Aquind Limited, and government representatives, and to collect narratives about the cultural identity of Portsmouth.	/
Number of Participants	24	/
Participant Profiles	Portsmouth residents, Aquind Limited, and government representatives.	/
Interview Format	Semi-structured interviews with open-ended questions.	/
Key Questions	- What are the main reasons for conflicts between the projecr of Aquind interconnector and the local residents?	-Communication between the government and local residents(40%) -Environmental disruption(32%) -Energy issues(20%) -Intergeneration(8%)
	-Why do local residents organize protests?	-Perceived Lack of Participation in Decision-Making -Opposition to Disruptive Infrastructure Projects -Desire for Alternative Solutions
Duration	30–45 minutes per interview.	/
Data Collection	Audio recordings with supplementary written notes.	/
Analysis Method	Thematic analysis to identify key	/

	patterns and unique insights.
Ethical Considerations	Participants were assured anonymity, / and informed consent was obtained.

3.3. The Stakeholder Communication Dynamics

The analysis of the communication dynamics surrounding the Aquind interconnector project reveals a complex yet predominantly traditional and unidirectional interaction among the stakeholders: Aquind Limited, the government, Portsmouth Council, the Eastney and Milton Allotment Association, and the public(See Figure 4). Aquind Limited primarily communicates with Portsmouth Council and the government through formal official letters and their official website, while their engagement with the public is largely limited to information dissemination via social media. The government, in turn, interacts with local associations and the public through newspapers, official websites, and social media, showcasing a top-down flow of information. Similarly, Portsmouth Council relies on official letters, its website, and notices to convey information, indicating a lack of dynamic communication channels. The Eastney and Milton Allotment Association plays a unique role by combining formal and grassroots approaches, such as attending onsite meetings with Aquind Limited inspectors while also engaging with the public through petitions, marches, and crafting localized advocacy efforts. Despite these efforts, the association still faces constraints in influencing the decision-making process due to the overarching dominance of government and Aquind Limited communication frameworks. Most significantly, the public's voice appears marginalized, as their communication options are limited to reactive measures like petitions or participation in protests, which lack the institutional backing to effect meaningful policy changes. This unilateral flow of information underscores the need for a more inclusive governance model that empowers citizens to participate actively in the decision-making process. "Public discourse must move beyond being mere recipients of information to becoming collaborative contributors, ensuring their concerns are addressed and integrated into project planning and execution." (Tsekleves, et al, 2022, p.101118)

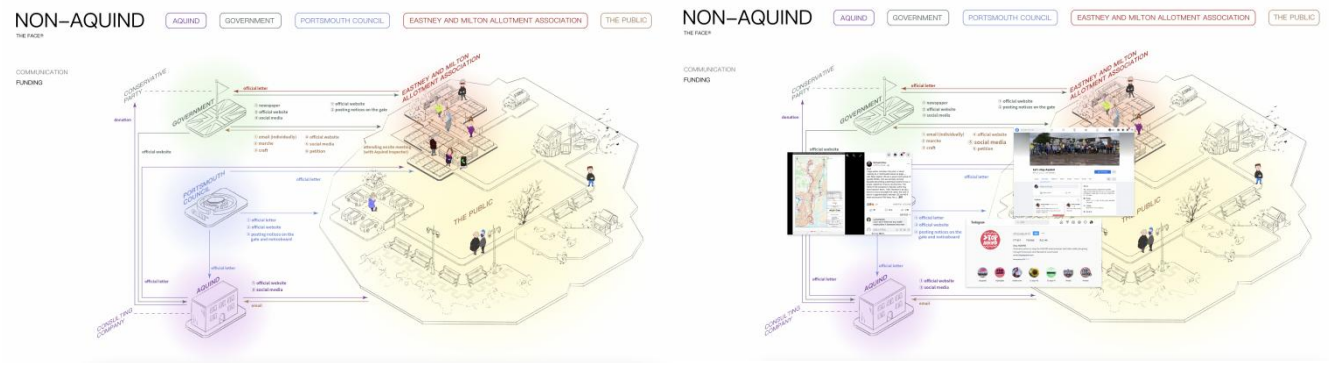

Figure 4. The Stakeholder Communication Dynamics.

4. Results

Building upon the findings and insights derived from these immersive participatory methods, a workshop was subsequently conducted to translate these sensory and contextual understandings into stakeholder engagement tools. By employing design metaphors, the workshop participants were encouraged to reflect on abstract concepts

and potential scenarios that resonated with their lived experiences, facilitating a deeper connection to the project. The workshop, titled "Pillow Bomb," involved 24 participants, representing three key stakeholder groups: Portsmouth residents, Aquind Limted and government representatives. Participants drew lots to assign themselves roles representing positions different from their own within the Aquind Interconnector project. “This diverse participant composition ensured a comprehensive representation of community values, environmental priorities, and economic objectives.” (Morelli, et al, 2017, p.3171-3184)

4.1. Crafting Tangible Metaphors: Props as Stakeholder Symbols

The props used in this participatory workshop were meticulously designed and handcrafted to embody the essence of stakeholder roles and interactions, drawing directly from the local textures, materials, and spatial dynamics identified during the fieldwork(See Figure 5). During the workshop, three key roles were defined based on the Aquind Interconnector project: Portsmouth residents, Aquind Limited, and government representatives. The three characters symbolize respectively core community values (Residents), environmental priorities (Government), and economic objectives (Aquind Limited). These roles were represented through distinct colors-orange for Portsmouth residents, green for Aquind Limited, and blue for government representatives. The props included masks to signify perspectives, pillows to symbolize participant stances, balloons to represent challenges or barriers, and word cards to encapsulate critical values. Masks were intricately hand-painted to symbolize diverse perspectives, with bold patterns and colors reflecting the distinct identities of each stakeholder group. Pillows, representing participant stances, were sewn with precision using soft fabrics and custom-printed covers that visualized key themes such as sustainability, community, and economic growth. The word cards were designed with striking typography and produced through silkscreen printing, ensuring clarity and visual appeal. These cards encapsulated essential stakeholder values and priorities, serving as pivotal tools during the activity. The symbolic costumes, including short-sleeved shirts, were tailored and decorated with hand-drawn illustrations and screen-printed designs to provide participants with a tangible and immersive role-playing experience. These props encouraged participants to embody their assigned stakeholder’s perspective, fostering empathy and deeper engagement with conflicting viewpoints. Botero et al pointed out “Through the tactile and visual elements, participants were able to internalize and reflect upon the diverse interests and priorities of each stakeholder group(Botero, et al, 2020, p.17-34)”. This immersive experience not only facilitated a more nuanced understanding of the project’s social dynamics but also enhanced collaborative problem-solving and dialogue. By physically embodying these roles, participants could more effectively engage in the negotiation of conflicting values, contributing to the development of more context-sensitive and inclusive solutions for the Aquind Interconnector project.

Figure 5. Symbolic Props and Steps to Participate.

4.2. Collaborative Co-Creation-"The Pillow Bomb Workshop"

Held on a bright April day in Milton Park, the Fete featured campaign materials by researchers, and lively discussions among attendees. Participants explored the exhibits, shared refreshments, and exchanged ideas in an engaging setting. As main part of the activity, participants began the activity by attaching balloons to their peers, a symbolic representation of the barriers to mutual understanding that often hinder effective stakeholder dialogue in energy infrastructure planning(See Figure 6). This visual and interactive approach provided a tangible way to illustrate the communication challenges that exist among diverse groups. As the balloons were removed, word cards hidden beneath them were revealed, representing the fundamental values of different stakeholders. The act of "unveiling" these cards symbolized the process of overcoming communication barriers and uncovering the core priorities of each group. Using these word cards, participants crafted sentences that articulated the priorities of their assigned stakeholder roles. This creative yet structured exercise allowed participants to express concerns and values from a specific perspective, fostering clarity and empathy in understanding. Finally, these individual sentences were collaboratively combined into cohesive narratives, reflecting the integration of diverse perspectives into actionable insights, including community engagement strategies, and communication principles that could inform future stakeholder dialogues, mitigate conflict, and guide decision-making in complex infrastructural projects.

The following are some sentence construction examples provided by the selected participants:

- Resident: "I'm concerned that the construction of the cable will disrupt the peaceful environment around my cottages that could harm my back yard."
- Aquind Limited: "We plans to invest substantial money to construct the cable, believing that it will provide the region with more reliable electricity, ultimately contributing to the energy sector's long-term growth."
- Government: "I organized a meeting to discuss the report on the potential impact of the energy project, with the aim to sanction the construction of the cable once all environmental concerns are addressed."

Figure 6. Photos of the Pillow Bomb Workshop.

The participatory workshop "Pillow Bomb" demonstrated notable success in fostering dialogue among diverse stakeholders. Post-workshop surveys, completed by all 24 participants, revealed a significant increase in their understanding of other stakeholders' perspectives. The group included 12 local residents, comprising long-term homeowners concerned about environmental impacts, community activists who had protested against the project, and undecided residents caught between support and opposition. 6 Aquind Limited representatives, including project managers and engineers, explained the company's objectives and technical aspects of the project. Finally, 6 local government representatives, including council members and urban planners, provided insights into regulatory challenges and the balancing act between development and public interests. On a Likert scale from 1 (low) to 5 (high), 87% of participants rated their understanding of conflicting viewpoints as 4 or 5, compared to only 33% prior to the session. "Qualitative responses also emphasized the symbolic props' effectiveness in conveying complex stakeholder values." (Shelley, 2016, p.271-296)

One participant remarked, "The masks helped me visualize how others see the issue, which made it easier to empathize with their stance. It was a tangible way to experience perspectives that were not my own, which deepened my understanding of the conflict and the emotional stakes involved." Another respondent shared, "Unveiling the word cards beneath the balloons was a powerful metaphor for uncovering hidden priorities. It really drove home the importance of communication in resolving these barriers. The process of peeling back layers to reveal what's underneath mirrored how we need to address the deeper concerns of all parties involved." Additionally, the structured activities, particularly the collaborative narrative-building exercise, were instrumental in aligning differing priorities into actionable insights. This exercise allowed participants to move beyond their initial positions and engage in a shared process of meaning-making. Several government representatives highlighted that the process clarified misconceptions they held about community opposition, enabling them to appreciate the residents' concerns in a new light. Portsmouth residents, in turn, expressed appreciation for the government's increased focus on sustainability and their willingness to integrate community values into policy discussions. Aquind representatives explained that the activity encouraged them to explore potential compromises, such as minimizing the environmental impact in exchange for economic benefits. This not only opened avenues for more balanced solutions but also fostered a sense of shared responsibility among all stakeholders.

5. Discussion

5.1. Empowering Local Communities through Participatory Governance

The case of the Aquind interconnector exemplifies the critical need for participatory governance to address tensions between national infrastructure goals and local environmental priorities. Drawing on Sherry Arnstein's "Ladder of Citizen Participation," this discussion underscores the limitations of traditional decision-making processes that marginalize community voices and highlights the transformative potential of empowering citizens to take an active role in governance. "Arnstein's ladder categorizes participation into eight rungs, ranging from manipulation to citizen control, illustrating how power dynamics affect the inclusiveness and legitimacy of public decision-making." (Arnstein, 1969, p.216-224) In the Aquind case, the perceived lack of meaningful consultation placed community members on the lower rungs, such as "informing" and "consultation," where their input held little influence over the project's trajectory. Residents' frustrations were amplified by the opaque decision-making process, which prioritized national objectives over local concerns. Liu explained that "By transitioning to higher levels of participation, such as 'partnership' or 'citizen control,' it becomes evident that shifting from the traditional top-down governance model to a bottom-up approach fosters more equitable collaboration" (Liu, 2024, p.385-387). Through speculative design activities, Portsmouth residents, Aquind Limted and government government representatives co-experience solutions, allowing citizens to move beyond mere consultation to active partnership and shared decision-making. Specifically, workshop participants were encouraged to critically analyze and reconstruct the proposed interconnector plans using tangible design tools, which democratized access to complex technical information. "This approach not only highlighted previously marginalized local concerns but also underscored the value of integrating community insights into decision-making." (Tan, 2023, p.2371) By granting citizens a platform to voice their perspectives and influence project outcomes, the "Pillow Bomb" initiative exemplifies the transformative potential of participatory governance. This commitment to co-creation aligns with Arnstein's notion of citizen control, showcasing a governance model where power is redistributed to ensure transparency, accountability, and equity in planning processes.

5.2. Governance-Led Design in Protest and Collaboration

The "Pillow Bomb" workshop exemplifies how governance-led design (GLD) can mediate tensions between protest and collaborative governance, offering a unique pathway for resolving complex socio-political conflicts. By framing governance as an inclusive and participatory process, the workshop explores how GLD can transform local opposition into constructive dialogue. The step-by-step process exemplifies GLD's core principles by actively involving participants in symbolically and practically addressing obstacles to mutual understanding. Attaching balloons to roles serves as a metaphor for communication barriers, visually representing the challenges that often hinder effective stakeholder collaboration. By removing the balloons and unveiling word cards that symbolize fundamental stakeholder values, the activity embodies the GLD approach of uncovering underlying priorities and promoting shared understanding. "The workshop's critical contributions lies in its ability to channel social protest into actionable policy recommendations." (Manzini & Rizzo, 2011, p.199-215) Particularly, participants co-experienced speculative scenarios addressing key issues such as land use, environmental risks, and community disruption. The workshop's design-led activities empower participants to critically examine contested projects and propose alternative approaches that balance national energy priorities with local environmental concerns. These scenarios were presented as policy briefs to local authorities, bridging the gap between citizen activism and public governance.

“Furthermore, the workshop demonstrated how design can foster empathy and mutual understanding by encouraging stakeholders to visualize alternative futures.” (Corubolo, et al, 2021, p.2471-2486) The crafting of sentences using these word cards encouraged participants to empathize with diverse perspectives by adopting specific stakeholder roles. The collaborative process of integrating individual sentences into cohesive narratives exemplifies the GLD principle of co-creating actionable insights through collective input. This approach not only aligns with the principle of participatory governance but also demonstrates the potential of GLD to transform conflicting viewpoints into shared accountability and innovative solutions for complex decision-making in energy infrastructure projects. By transforming protest into constructive engagement, the "Pillow Bomb" workshop illustrates the transformative potential of Generative Live Design (GLD) in navigating contentious socio-political landscapes. It offers a replicable framework for fostering inclusive dialogue, aligning conflicting priorities, and co-developing sustainable solutions in energy infrastructure planning. This methodology seeks to address complex social and political tensions through design activities such as symbolic balloon removal, role-playing, and co-creation of narratives. Rather than offering definitive solutions, it creates conditions for dialogue, reflection, and mutual understanding. While it does not eliminate the natural variability and contradictions inherent in stakeholder dynamics, it shows how GLD can serve as a catalyst for negotiating diverse priorities and fostering the emergence of more sustainable and socially responsive approaches.

6. Conclusion

Through the research of the proposed Aquind electric interconnector project, it becomes evident that traditional top-down communication methods often fail to address the complexities of stakeholder relationships. These communication gaps result in entrenched opposition and mistrust within local communities, highlighting the need for more inclusive and transparent approaches. The study advocates for a shift from traditional hierarchical governance structures to participatory governance models, emphasizing the integration of local residents' needs and values into decision-making processes. By utilizing the "Pillow Bomb" workshop, community members can transition from lower levels of participation, such as "informing" and "consultation", to higher levels, such as "partnership", in alignment with Sherry Arnstein’s “Ladder of Citizen Participation.” This approach advances their engagement in decision-making processes, empowering them to play a more active role in shaping outcomes. The research suggests that empowering communities to actively participate in decisions that affect their environment not only fosters a better alignment between national sustainability goals and local resilience but also ensures that local knowledge and concerns shape the policies impacting them.

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DESIGN FOR KNOWLEDGE CO-CREATION. REFLECTIONS ON UNIVERSITIES, SOCIETY, AND INTERDEPENDENCE.

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ABSTRACT | The article explores the complex interrelations between universities, society, and design in the context of knowledge co-creation and it discusses design's potential role as an ally in fostering collaborative, inclusive, and pluriversal approaches. Building on the concept of the Third Stream and its recent interpretations, the central argument of the paper suggests that current forms of university engagement and *civicness* are insufficient to address contemporary global challenges adequately.
In the first part, the article contextualises the evolution of universities' civic engagements within the framework of the Third Mission, presenting models such as the Civic, Entrepreneurial, Relational, and Engaged Universities. While these models highlight the growing societal role of higher education institutions, the discussion underscores their limitations in addressing coloniality and epistemic violence in academia and its knowledge production processes. Failing to rethink their role and embrace a more relational and situated understanding of knowledge, universities are missing the opportunity to support community self-determination and autonomy, as shared experiences of knowledge production, interpretation, and dissemination are considered essential for this purpose. Like academia, design, especially participatory design, is undergoing critical reflection, moving beyond simplistic visions of being intrinsically democratic or "good-doer." The discussion of positionality and privilege in design aligns with broader shifts

towards context-sensitive approaches rooted in interconnection and mutual responsibility. Although design has not yet fully integrated critical thinking into its discourse or comprehensively addressed its colonial responsibilities, the paper suggests that its ongoing transformation represents an intriguing opportunity to support the redefinition of collaborative dimensions promoted by academia towards external communities. This potential is also rooted in design's intrinsic emphasis on making and its inclination toward transformation and change. Also, the discussion defines its capacity for a pluriversal understanding of the world and its predisposition towards collaborative and community-based processes as crucial to the task.
The second part of the article examines the fitness of design in addressing knowledge-creation processes. Three key strengths of design in supporting knowledge co-creation are identified: its ability to enable metaphors, its role as a boundary object, and its tacit nature.
Finally, while acknowledging the study's limits and inherent complexities and contradictions, the preliminary results of the research point out that, with the support of design, academia could embrace a pluriversal vision of knowledge, conceptualising reality as an interconnected and diverse kaleidoscope of perspectives. Moreover, while engaging in these processes, design gathers insights that can enrich the discipline itself and reflect on which skills and/or attitudes designers should cultivate to effectively support processes related to the co-creation of knowledge, fostering ethical and more inclusive knowledge systems.

KEYWORDS | UNIVERSITY, KNOWLEDGE CO-CREATION, DECOLONIALITY, PLURIVERSAL DESIGN, INTERDEPENDENCE

1. Introduction

The article presents insights from a more articulate exploration into the complex topics of knowledge co-creation, university-society relationships, and the role of design.

Recently, various circumstances have brought me to the forefront of the opportunity—or perhaps the necessity—to reflect deeper on the connection between the discipline I have chosen as my own, design, and its capacity to respond to the events of the world, addressing inequalities and societal challenges (Campus Engage, 2017). I have felt compelled to observe, with the courage to delve beyond the reassurances that had driven my research and practices until now (Valentine & Farias & Farias, 2024), the ethical dimensions of what I was doing (Sweeting, 2018) —as both a designer and as an individual implicated within the academic context.

The lead hypothesis discussed here is that (1) universities should foster collective experiences of knowledge production (Bolisani et al., 2018), interpretation, dissemination, and memory-making (Kambunga et al., 2020) in order to support

community autonomy and self-determination (Kambunga et al., 2023). This generates two interconnected follow-up hypotheses. The first posits that (2) if universities engage in such collective practices, they are better able to acknowledge their mutual interdependence with society. This, in turn, opens up space for new, situated conversations that challenge traditional boundaries and foster more responsive and inclusive forms of knowledge production. The second suggests that (3) thanks to its inherently relational and collaborative nature, design can be instrumental in these processes—not by assuming leadership, which may reproduce problematic hierarchies, but by offering accompaniment, forming alliances, and fostering kin-ship (Haraway, 2016).

A design perspective on the Third Mission offers significant insights, as it intertwines topics such as organisational design, disciplinary responsibilities, and the development of designers' cultural and critical knowledge and competencies. More precisely, this article aims to contribute to the (inter)disciplinary scientific discussion on university, society and knowledge, offering a preliminary recognition of the most relevant aspects that shape the conversation on the ethical dimension of the phenomena under analysis and the role of design.

In the first part, after clarifying the methodology adopted, the article discusses the evolution of civic engagement in universities, followed by a critical discussion of how topics such as colonialism, hegemony, exclusion, and cultural extractivism influence reflexivity in academia and design. Then, design, particularly in its pluriversal and community-oriented expressions, will be discussed as a possible ally to overcome and bridge the distance between the university and society. After assessing the fitness of the design for this task, the paper will proceed with a discourse on knowledge and knowledge creation processes. Here, adopting stances offered by organisational and management sciences, we will debate whether design, with its practices and principles, is suitable for dealing with knowledge-related processes. Finally, while acknowledging the study's limits and inherent complexities and contradictions, the preliminary research results point out that, with the support of design, academia could embrace a pluriversal vision of knowledge, conceptualising reality as an interconnected and diverse kaleidoscope of perspectives. Moreover, while engaging in these processes, design can gather insights that can enrich the discipline itself and reflect on which skills and/or attitudes designers should cultivate to effectively support processes related to the co-creation of knowledge, fostering ethical and more inclusive knowledge systems.

2. Methodology

This research draws on two primary inputs: desk research and fieldwork. The desk phase is structured around a scientific literature review, initiated through a snowballing approach (Wohlin, 2014) using keyword searches on Google Scholar and Scopus. Keywords included topics such as "engaged universities", "third stream/mission", "knowledge co-creation", "decoloniality & academia", "design & knowledge co-creation". From an initial selection of relevant documents, the study

built a more systematic literature review to compare the most cited authorial positions. However, the systematic citation-based literature review aligned more with academic conventions than with necessity, as the critical perspective of the discourse upheld by this article challenges the limitations within the current scientific literature system and its predominantly colonised nature (Begum & Saini, 2019). For this reason, bibliographies of the most significant articles found were preferred as a springboard for further exploration. This criterion, while sometimes more time-consuming, better ensured that the reflection was supported by authors applying a post-heroic approach (Lupo, 2022), belonging (or presenting a perspective related) to groups that are under-represented, non-homologated or representative of different cultures of scientific thinking and knowledge production.

Although it will not be explicitly discussed throughout the article, the contribution of field research activities, primarily conducted through participatory observation and observational participation (Cardano, 2011), has been essential for understanding the multidimensionality of the phenomena under analysis. During the fieldwork activities, I also had the opportunity to reflect on and confront the positionality of my research and the complexity of advancing critical discourses on academia while simultaneously embodying the role of a researcher who is an integral part of that institution. This dual positioning has required a nuanced engagement on my part with the tensions between critique and a sense of belonging[1], which continues to shape the trajectory and implications of my inquiry.

The fieldwork consisted of personal experiences in co-design and co-creation within my research team (Campagnaro et al. 2024; Campagnaro & Ceraolo, 2022; Campagnaro et al., 2021; Campagnaro & Ceraolo, 2020) and participation in events, discussions, protests, workshops, several conferences and debates. Some of these experiences[2] predate the formal start of the research, serving both as evidence and as motivators for its relevance. In my fieldwork, I have prioritised extra-institutional experiences that critically interrogate the university's relationship with society, which I engaged with through the lens and the concept of design. These activities enabled critical reflection on power and colonial dynamics within institutions, universities, and the broader knowledge society.

3. University and society

To delve into the domain analysed in this work, it is first appropriate to discuss the evolution of universities' civic engagements. Contemporary Western academia, structured around three distinct missions, has evolved over the past fifty years,

[1] Given the ethnographic and sociological nature of these observations, this branch of the study will be explored further in subsequent works.

[2] Illustrative examples from some of these fields can be found in the projects presented in the book I co-authored with Cristian Campagnaro, *Ai margini. Un'antologia di social design* (see references for full details).

reflecting its intertwining with a complex network of interests and relationships (Blasi, 2023). It has shifted from an institution focused primarily on teaching and research to an active societal agent, addressing social, economic, and environmental challenges, shaping what Benson and Harkavy (2000) define as a third revolution.

This (re)evolution process has given rise to several visions of academia, which scholars have primarily translated into four models. Each model is traceable to a different push happening within the Third Mission: the Civic University (Benson & Harkavy, 2000), the Entrepreneurial University (Etzkowitz, 2004 and 2013), the Relational University (Castro-Spila & Unceta, 2014), and the Engaged University (Whitmer et al., 2010; Blasi, 2023). Even if they developed chronologically, these models are not merely stages of a linear progression. They represent the different forms the university has moulded into within broader transformation processes. These transformation processes have been shaped by specific priorities, stakeholders, and external pressures, such as collaboration with industries, social engagement, or the dynamics of networking and interactivity.

The Civic University arose in the 20th century and spread after the Cold War to counter criticisms of universities' detachment from local issues. It promoted active community collaboration to address societal challenges, bridging academic prestige and urban decline. It stemmed from the vision, offered since the early 1900s by scholars like Harper (1905), of the university as a “prophet of democracy”. Describing the phenomenon, Benson and Harkavy (2000) emphasise its dual role as both global and local institutions, highlighting the role of university-school partnerships in addressing inequalities and urban issues.

The Entrepreneurial University model was developed in the 1980s and 1990s in response to economic challenges and global competition, focusing on technology transfer and private-sector collaboration (Etzkowitz, 2004 and 2013; Pausits, 2015). Policies like the Bayh-Dole Act[3] (1980) enabled universities to retain ownership of patents, fostering innovation through patents, spin-offs, and consultancy activities (Bosio & Gregorutti, 2023). Despite its success in economic innovation, critics argued that commercial priorities often overshadow initiatives with greater significant impact (idem).

The third model is the Relational University. Developed recently, it represents an additional evolution, focusing on collaboration between universities and local communities to address complex problems. As described by Castro-Spila and Unceta (2014), it envisions universities as nodes within social innovation networks, fostering partnerships to meet regional learning, knowledge, and innovation needs.

[3] The Bayh-Dole Act (1980) is a U.S. law that lets universities, small businesses, and other organisations keep ownership of inventions created through federally funded research. Before this law, the government often held the patents, and many discoveries were left unused. This encourages universities to collaborate with companies to turn discoveries into products, boosting innovation and economic growth. For further info: https://www.govinfo.gov/content/pkg/USCODE-2011-title35/html/USCODE-2011-title35-partII-chap18.htm

Finally, the Engaged University model, emerging in the early 2000s, integrates elements of previous models, engaging directly with communities and companies to tackle societal challenges. It emphasises transformative research involving citizens throughout the process, from problem definition to dissemination. Scholars like Whitmer et al. (2010) and Gregorutti (2021) highlight its potential to integrate research, teaching, and service, driving meaningful social change through collaborative frameworks.

Within this evolutionary path, the renewed social commitment framed within the Third Mission also supported the growth of new international networks gathering engaged universities worldwide, like the Talloires Network (Hollister et al., 2012), emerging to drive positive social impact[4]. The Third Mission, the responsibility towards people, and the need to contribute to building more just and sustainable societies have become central to the discourse promoted by universities and their boards across much of the world, with a particular emphasis on the Global North.

Yet, the fundamental issue of who holds the power to produce knowledge and how it is created remains overlooked. The engaged—civic, relational, and so on—university is committed to impactful and meaningful interactions with the "outside world". Still, its practices, even the collaborative ones, rarely challenge the university-society divide or place knowledge co-production at the centre of this exchange.

From a critical perspective, such involvement confined within a well-defined framework—designed and governed by the university alone, could ultimately hinder more profound transformations. To frame the question provocatively: are we witnessing a process of futuring, fostering new and inclusive possibilities, or defuturing, perpetuating structures that limit genuine change and reinforce existing power dynamics (Fry, 2009)?

Scholars and critics argue that such contradictions must be faced directly (Borghi, 2020; Kalema, 2019). Studies and theories from decolonial and queer thought, as well as concepts developed within the onto-epistemologies of the Global South, call for and support a thorough examination of the forms of hegemony, exclusion, and cultural extractivism that can characterise knowledge production within university-society relationships.

Going even further, this research holds that, to foster such a change, the criticism of academic practices should not be directed solely at the university institution as a whole. Instead, it would be appropriate for the analysis to be rooted in specific disciplinary frameworks, ensuring that the transformative potential of these

[4] Quoting from the website: "The Talloires Network of Engaged Universities is a growing global coalition of 443 university presidents, vice-chancellors and rectors in 91 countries who have publicly committed to strengthening the civic roles and social responsibilities of their institutions. It is the largest international network focused particularly on university civic engagement." For more info: https://talloiresnetwork.tufts.edu/

considerations is integrated into the dynamics and challenges unique to each field of knowledge.

4. Design as a possible ally?

The task at hand is undoubtedly challenging. However, this reflection does not aim to evoke despair or disengagement. While endorsing a call for staying with this trouble (Haraway, 2016) and diving into a critical examination of the university's inner workings, this article also seeks to propose some constructive ideas, which are, of course, related to the role of design.

As mentioned, disciplines should undergo a critical reflection process (if they haven't already started yet), and design is no exception.

Design is indeed undergoing a transition (Escobar, 2015 and 2023; Kossoff et al., 2015; Tonkinwise, 2015). It is slowly moving beyond the comfort of a naïve and megalomaniac (Tonkinwise, 2019) self-conception as inherently salvific, democratic, and good-doer. This transition marks a shift towards a more profound, culturally grounded, and honest awareness phase (Smith et al., 2020). It resonates with Tony Fry's articulation of the shift from "sustainability" to "sustainment," which underscores the urgent need for a radical reimagining of values and institutions to ensure long-term ecological and social viability (Fry, 2012). In this process, design increasingly interrogates its political and ontological dimensions (Escobar, 2018), particularly within its participatory practices (Akama et al., 2019).

The reckoning requires acknowledging the profound influence of Eurocentric, patriarchal, and neoliberal paradigms in shaping design's historical trajectory. It also entails confronting design's complicity in perpetuating the very societal structures it now seeks to address under the banners of "responsibility" or "engagement" (Escobar, 2018).

Despite being a disruptive call that profoundly challenges both the idea that design has of itself and the rhetoric behind some of its most widespread practices, the change for more critical reflexivity lands on a fertile ground for a transformation: design's inclination toward change (Brown, 2009), its ability to navigate uncertainty, to comfortably inhabit spaces of transition (Campagnaro & Ceraolo, 2022), and its aptitude for exploring the margins - which, bell hooks describes as a place of "radical openness" (2015)- is an immense resource. These attributes can be critical for fostering preferable (Simon, 2019) systems, practices, and sensitivities (Manzini, 2015) and can also be amplified by design's intrinsic emphasis on "making" (Campagnaro & Ceraolo, 2022) and its practical, programmatic and concrete (Mbembe, 2016) orientation.

While design has not yet achieved significant milestones in fully integrating these critical thoughts or conducting comprehensive analyses of its colonial responsibilities (Tunstall, 2023), especially compared to disciplines like

anthropology, geography, or sociology—a particularly concerning issue, also given the limited availability of university courses addressing these topics—its nascent rethinking phase offers unique opportunities. This early-stage reflection aligns design and academia in a possible joint effort to develop more inclusive and collaborative knowledge production practices.

Adopting a design-inspired approach, we now aim to critique current practices while contributing to broader cultural change. The following sections address three key questions within the critical theory discourse, demonstrating the close alignment of reflections happening at the university level as an institution and design as a discipline.

4.1. Coloniality and Privilege

Critical theory is a philosophical approach and interdisciplinary framework that seeks to challenge and critique societal structures, ideologies, and practices, especially those perpetuating domination, oppression, or inequality. Originating from the Frankfurt School in the early 20th century, it emphasises integrating social theory with praxis to achieve emancipatory societal transformations (Devetak, 2013).

Critical theory underscores the importance of examining power, domination, and exclusion that shape the Western world, including the university's role (idem). Calls to ‘decolonise’ universities are not new (Mbembe, 2016). Within the critical theory framework, universities must confront the coloniality embedded in academia and its alignment with Eurocentric and neoliberal logic to call themselves socially engaged. As geographer Rachele Borghi points out, these systems historically linked colonial political goals to how knowledge is defined, constructed, and disseminated (Borghi, 2020).

In the 19th century, knowledge was an enormous power tool, with cultural domination preceding territorial conquest. University and society have always been, indeed, interdependent. Positivism fostered an uncritical trust in science, which extended to societal studies. Universities, therefore, became sites of epistemic violence, producing knowledge that reinforced dominant paradigms. While critical thought has addressed aspects of this history, Borghi (idem) observes that it falls short of adopting decolonial approaches or dismantling the structures of domination inherent in Western scientific knowledge.

Nowadays, under the Third Mission, universities that aim to achieve meaningful societal impact are therefore urged to embrace decoloniality. This entails scrutinising the content of knowledge and its producers, challenging the legitimacy of Western scientists as sole arbiters of knowledge.

Similarly, in design, decolonial perspectives are starting to expose entrenched power dynamics within the discipline’s practices and concepts. Following Escobar’s (2018) critiques, design practices are being made aware of how sometimes they perpetuate neo-colonial frameworks, even under the guise of empowerment. This critique aligns with the concept of coloniality of knowledge

(López-Yánez, 2021; Nimführ, 2022), challenging the assumption that neither design nor academia operates in a politically neutral space.

The reflection on the decolonisation of participatory design also examines how, if undiscussed, co-design practices risk legitimising privilege reinforcing unbalances if designers' roles are not critically examined (Smith et al., 2020). Schultz et al. (2018) argue that designers and academics often replicate the representational dimensions of movements without fostering substantive change, calling for more reflexivity and humility and transitioning from tokenistic inclusion to genuine empowerment.

Scholars highlight the need for an ontological shift in design practice, moving from an "ontology of separation" to an "ontology of relatedness" (Escobar & Maffei, 2021). In a brilliant paper published in 2024, van Zeeland describes this as transforming design from a transactional to a relational practice. Such a shift prioritises collaborative knowledge creation, enabling designers to challenge their complicity within systems of privilege and foster authentic co-creation processes (van Zeeland, 2024). This evolution in design, therefore, aligns with broader efforts to reimagine universities as agents of equitable and plural knowledge production, ultimately transforming academic and societal structures.

4.2. Knowledge, knowledges and the issue of speaking for *others*

Placing decoloniality at the centre of academic discussions requires rethinking the role of researchers and challenging entrenched epistemologies. "All knowledge is situated", Haraway (2013) notes, underlining the impossibility of neutrality or universality in scientific understanding. In this regard, critics discuss that knowledge systems rooted in Cartesian dualism—such as science/emotion and nature/culture—maintain exclusionary frameworks that align with neoliberal values while neglecting their colonial roots.

Dealing with the construct of "researched others" and, in general, processes of "othering" (Muftee & Rosales, 2022; Winschiers-Theophilus et al., 2010) is also problematic, as it reinforces hierarchical divides, silencing marginalised perspectives. Linda Alcoff critiques this "speaking for others" dynamic, highlighting how privileged voices, even with good intentions, often amplify oppressive structures. Borghi (2020), referencing Grosfoguel, critiques Eurocentric epistemologies for representing only a fraction of global perspectives while claiming universality. This imposition prevents marginalised groups from engaging with the world on their terms, who emphasise the need for frameworks that enable ontologies and epistemes outside the Western canon to flourish (Moreira & Diversi, 2012).

This monocultural dominance not only marginalises diverse perspectives but also ignores crucial dimensions such as the historicity of the body, intersectional oppressions, and the voices of women and queer people, especially from the Global South. Knowledge systems in the Global South, which integrate mind, body, heart, and spirit, are often erased. Even in participatory research, researchers

frequently retain control over knowledge creation, producing inaccessible outputs that alienate communities.

Participatory design, likewise, sometimes perpetuates these exclusions by failing to examine critically who defines what constitutes the knowledge and the meanings of the projects. Despite well-intentioned goals, design scholars are acknowledging that design practices often remain constrained by predefined briefs, client expectations, funding requirements, and tight timelines. They are also highlighting that decolonising design requires recognising its inherent plurality—not only in the diversity of its outputs but also in its varied approaches and underlying ontological foundations (Taboada et al., 2024).

Moreover, authors discussing reflexivity within the participatory design reflections are pushing to rethink “inclusivity”, claiming that it must extend beyond demographic representation to include embodied and emotional experiences. Two inspiring concepts are worthy of mentioning in this regard. Albarrán González (2022) introduced the idea of *corazonar*, which emphasises integrating heart, emotions, and collective reasoning into the design process. The researchers explain that “the act of reasoning with the heart in collectivity (corazonar) allows going beyond analytic reasoning; it integrates emotions and our sensitivity for a holistic research approach” (Idem).

The second concept is using *yosotros*, a collective *we* transcending individualism, in participatory design. This approach underscores relationality and shared humanity (Idem).

By embracing *corazonar* and *yosotros*, therefore, promising signals can be traced to participatory design practices to foster equitable and transformative collaboration, build deeper connections, and inspire collective innovation.

4.3. Acknowledging interdependence

Finally, the third point of analysis within the debate of the proximity of academia and design in the critical process of addressing the inequalities around knowledge co-creation is related to acknowledging the interdependence that connects the two to society.

Academia is frequently described as an ivory tower. This image, used to criticise universities' detachment from society, might even reinforce the flawed perception of division. Indeed, universities are not separate from society but embedded within its practices, meanings, and processes. They are integral to broader societal systems, and the separation between "outside" and "inside" academia is misleading. Paradoxically, it would better fit the purpose if it were framed as a “corridor within a building” than a “tower”: an instrumental architectural connection, which is part of something whole. Not detached, not higher, but just a part of the building (society, in our case). So, just like a corridor and its respective building, the university and society are interdependent and need each other more than they might be reciprocally willing to admit.

Interpreting their relationship in terms of interdependency helps to frame knowledge production (as "what universities do") as a collaborative process that bridges people's experiences and organises them into shared understandings with transformative capacity. Without people, universities lack purpose. Without purpose, knowledge is hollow. Without knowledge and its transmission, experiences and people are isolated.

Recognising interconnectedness among actors, spaces, and processes is central to the co-design discourse. Co-design, indeed, thrives in participatory networks that empower stakeholders. As Koskinen emphasises, "relationality is a cornerstone of design research as it is the relational aspect that binds human beings, the environment, and objects into a coherent fabric of meaning" (Koskinen, 2023, p. 15). Relationality anchors co-design in networks and participatory practices, shifting the focus from objects to empowering relationships and sustaining collective agency.

5. Design's strengths: navigating pluriversality & the co-s.

To summarise: discussing knowledge in terms of universality and neutrality can be troubling and could reinforce unfair power structures; instead, it would be more appropriate to conceive the question as a plurality of *knowledges* (Haraway, 2013) and ways of knowing (Cross, 1982). Researchers are also always implicated. Therefore, knowledge is situated, not objective. As Rachele Borghi brilliantly explains:

> "Decolonising involves perceiving reality as kaleidoscopic—resembling more the multifaceted images of a kaleidoscope than the rigid linearity of cartographic projections. The kaleidoscope allows for a reinterpretation of reality, creating new images and envisioning alternative realities. This perspective goes beyond merely adopting different viewpoints; it revolves around initiating actions. The kaleidoscope is a tool that offers multiple, decentralised perspectives without centres or peripheries. By simply rotating, it shifts the coloured fragments within, and new and vibrant constellations emerge. Through this lens, the kaleidoscope reveals the pluriversality inherent in the world-system. (Borghi, 2020, p. 17. Translation by the author).

Reimagining an academic institution that welcomes the idea of kaleidoscopic knowledge (Borghi, 2020) aligns with a pluriversal vision: it means envisioning knowledge as an archipelago of enunciation points, a constellation of decolonial micropolitics and experimentation workshops, grounded in one's positionality and privileges (Idem).

Embracing pluriversality requires changing the lenses through which reality is observed and fundamentally altering the tools used to view, interpret, and project oneself within it. This pluriversal idea of the world and knowledge is, once again, a

familiar concept to delve into wearing the “design shoes”, as the following paragraph will explain.

After that, the second major strength offered by design as an ally within this discourse will be discussed: the participatory, collaborative, and co-creative dimensions already mentioned. The “co-s” question will be addressed in the second paragraph, and the nuances of its meaning and implications will be explored.

5.1. The pluriverse

The concept of the pluriverse, or pluriversality, can be summarised as the idea of a world where many worlds coexist. Escobar (2018) explains that it fundamentally revolves around difference, cautioning against efforts to efface or normalise it. The pluriverse encourages nurturing and embracing diversity—whether biological (hence the focus on biodiversity), epistemic (coloniality), cultural, or, as is increasingly discussed today, ontological.

Among transformative and relational disciplines, design is uniquely suited to navigating a vision that understands reality as a coexistence of interconnected and interdependent worlds (Leitão, 2023). Escobar (2018) notes that design is the transformative discipline (as we already mentioned) best equipped to respond to the call for a world made up of many coexisting and interdependent realities rather than a single, homogeneous, hierarchical one (idem).

A central feature of the pluriversal design approach is its processual and relational nature (Smith et. al., 2024). As Dunford (2020) notes and van Zeeland (2024) discusses, the pluriverse embodies a process, a value, a human capability, a form of social design and a tool. Pluriversal design acknowledges the necessity of engaging with ontological differences: pluriversality is not a synonym for inclusivity nor diversity. Instead, it refers to humans' capacity to build worlds differently (Leitão, 2022; Leitão & Noel, 2023).

Finally, pluriversal design further emphasises dialogue and collaboration among diverse worlds, maintaining a critical stance toward power dynamics. It involves moving beyond an ontology of separation to an “ontology of relatedness”. Such relationships are fostered through participatory practices that include nature as an entity and promote the autonomy and emancipation of the communities involved.

5.2. The “co-s”

Secondly, there is the topic of collaboration. This article intentionally addresses the dimension of co-creation (Sanders & Stappers, 2008) or, more generally, of the “co-s” of design, as the last part of this overview.

This choice is twofold. On the one hand, the discussion on collaboration and participation within design processes is well-known, extensively researched, and represented by numerous esteemed authors (Boyle & Harris, 2009; Steen, 2013;

Meroni, 2018; Manzini, 2015; Björgvinsson et al., 2012; Ehn, 2008; Manzini & Rizzo, 2011; Manzini & Staszowski, 2013; Papanek, 1971). An introduction to the concept is deemed, therefore, unnecessary in this context, and we prefer to limit ourselves to referring to some of these resources for those who wish to contextualise the discussion better.

In addition to this, a nomenclature debate regarding the question of the "co-s" within the design discourse would have been out of place, as co-creation is understood here as a broad umbrella term encompassing a range of related concepts: co-design, co-planning, co-production, and even co-crafting (Campagnaro & Ceraolo, 2022). The idea behind this is that the potential of this variety lies not in describing radically distinct practices separated by clear boundaries or rules but in imagining collaboration as a fluid process (idem). Discussing a design practice that enables the collaborative construction of knowledge means envisioning a discipline capable of all these functions—and even some more. Some are already emerging - co-writing or writing together (Blank & Nimführ, 2023), and others are interesting to envision (co-presenting, co-advocating, co-teaching?).

However, that being said, there is indeed a specific meaning or declination of "co-" that stands before the different design practices that we feel the need to stress in this context: that is the "co-mmunity".

While aiming to avoid any rhetorical drift, for this article's purpose, it is essential to emphasise that discussing knowledge co-creation requires the actors involved to think of themselves as part of a community (Wenger, 2009) or a group, sharing a purpose, embodying reciprocity and care (Contadini, 2021; The Care Collective 2021). This sense of togetherness, which resonates from the idea of conviviality (Illich, 1974) and the sense of belonging to a group taking part in a shared process (Ciampolini, 2019), is seen as the essential foundation through which the collaborative framework and shared sense-making can take shape.

With the emphasis on the community dimension in mind, we can move on with the discussion and explore the matter of knowledge production.

6. Knowledge creation and the role of design

Until now, we have examined how design, with the evolving awareness of its limitations and strengths, can be a suitable partner of academia in rethinking knowledge production. We have also explored the strengths that design has to offer as an ally within these processes. However, we must now address the topic of knowledge itself.

It would be simplistic to assume that participatory design and co-creation are inherently suited to fostering co-produced knowledge. In this regard, Taboada et al. (2024) note that the emergent design culture continues to function within a

Cartesian view of individuals and things despite its emphasis on participation and interactivity.

Also, we will not use this space to analyse the collaborative practices, somehow design-friendly, already carried out in universities, such as living labs or citizens science workshops. Those, while valuable, often lack a proper design foundation and/or a critical perspective on knowledge production dynamics we discussed in the first paragraphs.

Instead, in the following sections, we will discuss whether a pluriversal, decolonised and situated design could legitimately engage with knowledge production using the theoretical framework provided by the field of Organisational knowledge and management science.

Organisational knowledge and management science studies how organisations create, share, and apply knowledge to foster innovation and adapt to change. This field explores the interplay between tacit and explicit knowledge and the processes that explain how it is developed, acquired and transmitted (Argote et al., 2003). Scholars such as Polanyi, Nonaka, and Takeuchi, whose contributions are milestones within this field of studies, offer foundational insights into the field's theoretical ground and the purpose of assessing design's possible role within these processes.

In a nutshell, Polanyi is the "father" of the concept of tacit knowledge (Polanyi, 2009). Criticising positivism, he argued that explicit knowledge is inseparable from tacit understanding. He demonstrated that even formal sciences rely on tacit dimensions, as individual judgment shapes the interpretation and application of explicit knowledge (Polanyi, 2009). Building on this, Nonaka (1994) developed the Dynamic Theory of Knowledge Creation and, together with Takeuchi, discussed the "knowledge spiral" model (1996), which describes how organisations transform individual knowledge into collective knowledge through iterative processes of socialisation, externalisation, combination, and internalisation.

In the following paragraphs, we will investigate three key dimensions within the domains of Organisational knowledge and management science that demonstrate that design is particularly suited to supporting knowledge creation. In particular, we will discuss design processes as a process of metaphor creation and active world-building, the relationship between design and boundary objects, and the proximity between design and tacit knowledge. This short investigation will allow us to finally assess the potential of design as a transformative tool for collaborative knowledge production and will ultimately accompany the discussion towards the conclusions.

6.1. Design as metaphors enablers

Metaphors play a crucial role within the knowledge discourse and, precisely, in the knowledge creation spiral. According to Nonaka, metaphor is essential for converting tacit knowledge into explicit knowledge (1994). Lakoff and Johnson (1980) point out that the essence of metaphor is understanding and experiencing

one kind of thing in terms of another. It follows that while metaphor does not constitute a thought process, it enables new behaviours by drawing inferences from the model of another behaviour.

Moreover, within organisational theory, metaphor is not only a preliminary step in transforming tacit knowledge into explicit knowledge; it is also a vital method for creating networks of concepts (Nonaka, 1994). These conceptual networks generate innovative insights about the future by drawing upon existing knowledge. As Bateson (1973) suggests, metaphor's contradictions and intuitive associations can lead to learning that challenges and negates established assumptions, fostering the development of new paradigms.

This creative, exploratory process is central to design, a discipline that addresses complex problems and imagines innovative solutions by combining seemingly incongruent elements. In design, metaphor transcends its traditional definition as a rhetorical figure, serving instead as a creative, cognitive, and practical tool (Campagnaro & Ceraolo, 2022). The conceptual systems through which we think and act are fundamentally metaphorical: this is particularly significant in design, where imagination and intuitive learning through symbols, prototypes, shapes, materials and gestures are crucial for forming new conceptual and perceptual connections.

The many designerly ways of knowing (Cross, 1982) and design's capacity to transform tacit knowledge into explicit knowledge through metaphors, analogies, and models position the discipline as an appropriate tool for supporting knowledge creation and exchange (Petrova & Campagnaro, 2017).

6.2. Design as a boundary object

Star and Griesemer (1989) introduced the concept of a boundary object to describe artefacts that facilitate collaboration among different social or professional groups. These objects serve as bridges between practices, cultures, or contexts that sociocultural boundaries would otherwise separate.

According to Kanwal et al. (2019), boundary objects play a pivotal role in fostering knowledge co-creation by acting as bridges between distinct social worlds. Their unique capacity to facilitate collaboration across boundaries lies in their interpretive flexibility, enabling them to be understood and utilised differently by various groups while retaining a shared identity across contexts. This dual quality allows actors with divergent perspectives, knowledge systems, and cultural assumptions to collaborate without complete alignment.

Following this line, scholars such as Thinley et al. in 2020 defined design as an "interactive boundary object". They highlighted its role in fostering interdisciplinary interactions by enabling diverse actors to co-create while maintaining their distinct perspectives. As a boundary object, design balances interpretive flexibility and shared meaning, allowing reflexivity and dialogue across disciplines. This process generates novel outcomes by integrating varied vocabularies, practices,

and values, transforming design from a static tool into a dynamic framework for collective problem-solving.

Similarly, as Mark, Lyytinen, and Bergman (2007) highlight,

> "Design as a boundary object possesses four essential characteristics: the capability for common representation, the capability to transform design knowledge, the capability to mobilise for action, and the capability to legitimise design knowledge" (Mark et al., 2007, p. 551).

These qualities empower design to bridge gaps between social worlds, facilitating the sharing and transformation of knowledge.

Thinley et al. (2020) also focus on design's role in enabling interdisciplinary interactions. They argue that "design is an interactive boundary object allowing different meaning structures to co-exist and co-inform actors from multiple disciplines" (p. 5). In interdisciplinary research centres, for example, divergent definitions of design paradoxically enhanced collaboration through shared reflexivity, which valued the contributions of all participants.

From this perspective, design is both a technical tool and a cultural and political mediator. It facilitates collaboration among diverse social worlds, enabling meaningful exchanges and co-creation across boundaries.

6.3. Design knowledge as tacit knowledge

An additional factor aligning design discipline with the broader discourse on knowledge creation is its inherently tacit nature. Design knowledge is often deeply embedded in practice and intuition, making it challenging to articulate or codify fully. These characteristics push the design to cultivate a distinct, almost tacit sensitivity toward capturing content and insights that are difficult to express in words or text.

Whether understood as a manual and artisanal skill or the ability to identify problems and generate innovative solutions or meanings, design capability is frequently *slippery* to codification. While design knowledge can be subjected to processes of exploitation, its foundation remains deeply rooted in personal experience, intuition, and the implicit understanding of context, materials, and processes. In this regard, Polanyi (2009) famously observed that "we can know more than we can tell," which can be interpreted as much of what designers understand and apply cannot be easily articulated or formalised.

This tacit nature is evident in various aspects of design practice. For instance, an experienced furniture designer may intuitively "feel" the correct curvature for a chair without consciously reasoning through every step. Similarly, Schön (1983) highlights how reflective practice enables designers to draw upon tacit insights when deciding proportion, aesthetics, or functionality during the design process. Following Nonaka and Takeuchi (1995), it is also possible to emphasise the role of tacit knowledge in creativity and innovation and, therefore, in design, where

problem-solving seldom depends on unspoken insights cultivated through practice.

The tacit dimension of design knowledge stresses the importance of experiential learning and the transmission of skills through observation, imitation, and hands-on engagement. Finally, this perspective reinforces the unique role of design in fostering knowledge creation, as it bridges the gap between the unspoken and the articulated, transforming intuition and experience into innovative and actionable insights.

7. Closing remarks and future perspectives

Building on the hypotheses outlined in the first paragraph, this article has explored (1) how the call for universities to foster collective experiences of knowledge production, interpretation, dissemination, and memory-making can be enacted both theoretically and practically to support community autonomy and self-determination. In doing so, it has examined (2) the implications of acknowledging the mutual interdependence between universities and society, and (3) the enabling role that design—when approached not as a leading force but as an ally capable of offering accompaniment, building alliances, and fostering kinship—can play in such processes.

In doing so, we have examined various transformative processes currently reshaping both academic institutions and the design discipline, particularly through the lenses of decoloniality, epistemological violence, hegemony, exclusion, and cultural extractivism. These processes often converge in critical zones of friction, revealing the persistent struggle of universities to reconfigure their modes of engagement with society. Moreover, within the dominant discourses on the Third Mission and social engagement, universities often fail to critically question the dynamics of knowledge production, which remain largely under their control. Consequently, society continues to be treated as the "other," kept at a distance and deprived of the capacity to articulate its own knowledge, meanings, and memories.

Although these findings are preliminary, they suggest that the pluriversal vision—which asserts the possibility of conceptualising the world and its structures in plural, overlapping, and multifaceted ways—when combined with the capacity of design to support participatory and community-based knowledge processes, offers a promising pathway grounded in collaboration and ethics. This supports and confirms hypotheses 1 and 2. Hypothesis 3—regarding the capacity of design to support knowledge-related processes—was also confirmed, particularly by exploring the relationship between design and concepts such as metaphors, boundary objects, and tacit knowledge.

Further research is essential to identify and investigate both existing and yet-to-be-discovered practices through which design can be harnessed to help universities foster new paradigms of co-created knowledge. Equally important is

for design to assimilate the lessons emerging from this bridge-building experience between universities and society. Such integration could advance debates on the boundaries, purposes, and competencies that define the discipline. It could also stimulate the development of new curricula and (trans)disciplinary dialogues that connect co-creation experiences with the evolving body of critical discourses and growing reflexivity within the field.

The challenge is broad, marked by complexity and contradictions—yet it constitutes an aspirational horizon that invites further exploration.

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DESIGN, HEALTH AND WELL-BEING. A POST-PANDEMIC EDITORIAL PROPOSAL

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ABSTRACT | In late 2021, as the COVID-19 pandemic continued to claim millions of lives and disrupt global education and economies, we decided to dedicate an issue of *Base Diseño e Innovación* magazine to health and well-being. We invited design, psychology, and healthcare experts to explore how design can improve health systems and enhance people's quality of life. This effort culminated in the publication of the volume *Design, Health, and Well-being* in 2023. This submission will address the project's background, outline the editorial proposal, and present the publication in print format.

KEYWORDS | DESIGN FOR WELL-BEING, HEALTHCARE, FRUGAL INNOVATION, EDITORIAL PROPOSAL

1. Project Background

Base Diseño e Innovación is the academic magazine of the School of Design at Universidad del Desarrollo. It serves as a platform for interdisciplinary academic dialogue, bringing together experts from academia, industry, government, and civil organizations. The magazine includes sections such as Perspectives, Cartography, Interviews, Opinion, Showcase, and Degree Projects.

In late 2021, as the COVID-19 pandemic continued to impact millions globally, the Base Diseño e Innovación editorial team decided to dedicate an issue to health and well-being. With education, economies, and social structures deeply affected, we sought to assess the impact of design on healthcare before and during the pandemic and explore innovative solutions that had improved lives.

We invited experts in design, psychology, and healthcare to examine how design solutions could enhance well-being and address challenges within health systems. The edition featured contributions from over 40 professionals, including authors, editors, journalists, designers, illustrators, and translators.

This issue highlighted how design can drive positive change in health systems through interdisciplinary collaboration and creative problem-solving, reinforcing its role as a vital tool in addressing global health challenges.

2. Editorial Proposal

Paula Daza, the former Undersecretary of Public Health during the pandemic addresses the relevance of public-private collaboration in facing health emergencies and emphasises the importance of implementing public policies that consider the communities' idiosyncrasies (Figure 1).

Figure 1. The future of public health lies in interdisciplinarity and listening to communities.

Mariluz Soto, Haian Xue, and Emmanuel Tsekleves explore a triadic approach that equips designers with an observational framework and a holistic understanding to guide well-being-focused interventions (Figure 2).

Figure 2. Head, heart and body perspective for health and well-being from design.

Hernán Díaz and Víctor Montre present a conceptual framework for understanding innovation, emphasise the importance of people-centred innovation, and highlight the value of frugal innovation in disadvantaged contexts (Figure 3).

Figure 3. Innovation in health: the power of design to improve lives.

Christian Guellerin argues that to help organizations design, produce, and sell products or services differently, designers must take on management roles in both public and private sectors (Figure 4).

Figure 4. Ethical leadership, the new frontier.

Bon Ku and Ellen Lupton, authors of Health Design Thinking, emphasize that design thinking fosters a people-centred approach, enhancing attentive listening and precise observation of healthcare beneficiaries' needs (Figure 5).

Figure 5. The interdisciplinary approach of Ellen Lupton and Bon Ku.

The Geriatrician Juan Carlos Molina urges designers to lead the change towards a *gerontoculture* that respects older adults, offering health and wellness and areas for leadership (Figure 6).

Figure 6. Design should lead the transition towards a gerontocratic culture.

Rebecca Cain, author of "Design for Well-being", addresses her career as a researcher in transdisciplinary design and the concepts of subjective well-being, sustainability in well-being, and happiness (Figure 7).

Figure 7. Towards systems thinking.

French designer Philippe Starck said that design sparks meaningful conversations. We invited physicians, psychologists, educators, architects, and designers to discuss design's role in driving innovations that enhance health and well-being across different life stages and contexts. This engaging dialogue is just beginning.

About the Authors:

Úrsula Bravo is an Associate Professor at Universidad del Desarrollo School of Design (Chile) and the Editor-in-Chief of the magazine and open-access journal Base Diseño e Innovación. She holds a Bachelor's in Design and two Master's degrees in Education and Humanities. She is a PhD candidate in Education at Universidad Católica de Chile. Co-founder of Design Literacy International Network and member of the Design Research Society. For two decades, she has been interested in exploring the relations between design and education.

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DESIGNING FOR FOCUS: CO-DESIGN SOLUTIONS TO MITIGATE TASK INTERRUPTIONS IN EMERGENCY ROOM IMAGING SERVICES.

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ABSTRACT | This working paper responds to the call for the reinvestigation of ethical practices in public design, focusing specifically on the design for health approach to addressing unsolicited interruptions faced by caregivers specializing in medical imaging (MIR) and scanners within Emergency Room (ER) settings. Utilizing a co-design methodology, this study aims to identify and mitigate the effects of these interruptions through collaborative, empathetic, and contextually sensitive solutions that respect the ethical complexities of caregiving environments.

Our research involved a multidisciplinary team of 10 designers under the guidance of 4 faculty supervisors. Together, we conducted one day of fieldwork across three public hospitals in Le Mans, La Roche Sur Yon, and Angers. Through direct observations, interviews, and contextual inquiry with Emergency Room caregivers, we gathered insights into the operational dynamics and interruption patterns within these high-stakes healthcare settings. Following the field immersions, the designers proposed solutions that directly respond to the needs identified.

The findings from this study provide a foundation for ethically grounded, co-designed interventions aimed at supporting ER caregivers. These solutions seek to reduce disruption and enhance the quality of care, aligning with a design for health approach that advocates for collaborative design as an ethical imperative in public healthcare

innovation. This work contributes to the broader discourse on ethical practices in design for health and underscores the value of interdisciplinary, co-creative processes in addressing complex healthcare challenges.

KEYWORDS | Task interruption, Radiology, Prevention, Co-design, Care safety

1. Introduction

Tasks Interruptions are an inherent aspect of daily life, and this is also the case in the healthcare sector. Task interruptions have been defined by the French National Authority for Health as the unexpected, temporary or an end to human activity (Brixey et al., 2007). The reason for such interruptions may be the operator's own responsibility, or it may be external. This results in a disruption to the flow of the activity, a loss of concentration on the part of the operator and an alteration in the performance of the act. Any secondary activities that may be undertaken serve to compound the disruption to the initial activity (*guide_HAS 2016*). Task interruptions are complex phenomena involving the people who suffer them as well as those who cause them. To develop a comprehensive understanding of these characteristics, it is essential to consider various profiles, depending on whether the person being interrupted or the one causing the interruption (Brixey et al., 2007). To develop a holistic vision, it is useful to take into account both the person being interrupted and the person responsible of the interruption itself and the context of the interruption (McCurdie et al., 2017).

In the health care field, task interruptions are recognized as a risk factor for serious adverse events and lead to management errors by emergency nurses (Delmas et al., 2020) and within multi-professional teams (Compère et al., 2023). In the field of radiology, several studies have shown that radiologists increase their reading time when interrupted. Moreover it may lead them to the conclusion that a case is normal when it is not. It have been demonstrated that Interruptions reduce efficiency and pose safety concerns for patients when reading abnormal cases (Ratwani et al., 2016) (Wynn et al., 2018) (Williams & Drew, 2017) (Halsted & Froehle, 2008). To the best of our knowledge, no study has been carried out on medical electroradiology manipulators (MERM).

There is also an ongoing consideration of identifying the times when professionals can be interrupted or where interruption could induce less risk of errors for them as well as the patients. The identification of moments of low cognitive intensity, or conversely, of very high intensity, during cardiac surgery, facilitates the anticipation of moments when the surgical team can be called upon without generating disruption (Dias et al., 2018).

It is not feasible, nor advisable, to eliminate all interruptions. Indeed, vital emergencies must be accorded the highest priority, as must all urgent care. In instances where a professional identifies an error in progress, it is imperative that they are able to interrupt a situation or a colleague.

Interruptions have been identified as a cause of adverse events, in particular errors relating to identity monitoring. However, no solutions have yet been devised for imaging departments to deal with this problem.

Interruptions have been shown to have ramifications for both the safety of care and the well-being of workers. Interruptions have been shown to increase cognitive load and have an impact on working memory (Chen et al., 2024). Consequently, these disruptions can induce mental fatigue, stemming from the effort required to transition between tasks and then return to the initial task (Hill et al., 2023).

The quality of care administered to patients in healthcare establishments is a matter of significant public health concern. The extant literature on the subject is primarily based on field observations, and the solutions for preventing and correcting them are inadequate.

The risks and issues are common to all healthcare establishments, even if the layouts and organizations vary from one establishment to another.

Prevention tools have been developed to limit work interruptions. One such strategy involves the recommendation of wearing a vest when preparing medicines, serving as a visual cue to staff that the wearer is not to be disturbed. A study found a statistically significant reduction in interruptions with this highly visual device. However, the extent of this reduction and its likely impact on error rates must be considered against the effectiveness of other interventions, associated costs, likely acceptability and long-term sustainability of such interventions (Westbrook et al., 2017).
In this context, how can design for care be an ethical and relevant solution for devising innovative solutions to the problem of interrupted work in emergency imaging departments?

Utilizing a co-design methodology, this study aims to identify and mitigate the effects of these interruptions through collaborative, empathetic, and contextually sensitive solutions that respect the ethical complexities of caregiving environments.

2. Methods

Hospital design is a discipline that harnesses creativity to solve problems and co-create solutions with the goal of improving patient pathways, enhancing hospitality, designing new care modalities to support treatment, resolving everyday irritants, and addressing forward-thinking issues in hospital planning (French Network of Hospital Design).
Hospital design takes several forms:

- Service Design: Reinventing patient pathways and professional workflows.
- Space Design: Contributing to architectural projects (user experience assistance).
- Product Design: Creating tools that facilitate the work of professionals and healthcare devices for patients.
- Digital Design: Developing digital solutions to improve patient care and support healthcare professionals' work.
- Systemic Design: Creating new processes, organizations, or procedures at the level of a department or the entire institution.

A call for projects aimed at co-designing and experimenting with prototypes addressing field issues identified in the hospitals within the HUGO territorial scope, was launched by the GCS HUGO in February 2023. This initiative paved the way for caregivers' teams from the West region to come together around a project.
The project "SPRITS" (design Solution for the Prevention of Task InterruptionS in Radiology), co-led by three institutions, the Hospital Center of Le Mans, the Hospital Center of Vendée, and the University Hospital center of Angers, was the winner of the GCS HUGO call for projects.
The project references of "SPRITS" benefited from the expertise and support of ten master's students in Care Design under the guidance of 2 faculty supervisors between October 2024 and February 2025.
The challenge of this project lay in the mutual interest of co-constructing a solution that takes into account the concrete needs of users (Cottam & Leadbeater, 2004) while leaving room for the creativity of designers to respond to a multifactorial problem.
The study was constructed in the following stages:

- An immersion day in the three reference hospitals of the project, designed to collect user's needs through various approaches and develop the identified priority themes.
- A co-construction workshop with healthcare professionals to refine the proposals, engage stakeholders in the transformation process, and gather needs, expectations, and desires.

- A final presentation with concrete, prototyped proposals that could be implemented in the three hospitals.

The objective of this approach was twofold: firstly, to enable the student designers to understand the environment, the layout possibilities and the safety issues; and secondly, to enable the MERM and referents to objectify their organization and come up with innovative solutions. Mutual respects, commitment to the project and collaboration have been fundamental.

3. Results

A total of three public health establishments have collaborated to address the shared challenge of disruptions to the work of radiographers in emergency radiology departments. Each site benefited from a day of observation, comprising four hours of shadowing and three hours of interviews with teams (MERM, radiologists, secretaries, etc.) by groups of
3 or 4 students.

This collaborative approach enabled the objective documentation of interruptions and the identification of contributing factors, whether related to the environment, inter-professional interactions, or patient- related factors. Teams of MERM in emergency imaging departments are required to manage interruptions due to the numerous interactions inherent to their professional activities. The root causes of these interruptions have been identified as arising from inter-professional interactions, interactions between caregivers and patients, and the utilization of communication tools to ensure round-the-clock availability. These tools facilitate communication in various settings, including waiting areas, corridors, and the management of patients either on stretchers or on foot, emergency situations, and the management of calls.

Subsequent to the immersive days, three 4-hour working sessions were held at 7-week intervals. The initial session involved the presentation of observations and interviews conducted at each site. The main themes and avenues of work were then grouped together. In the subsequent session, groups of students presented numerous design projects in response to the issue of task interruptions. Each solution was discussed in terms of potential constraints, hygiene problems and, above all, the benefits it could bring.
The third and final session was dedicated to the presentation of the final solutions developed by the students.
Each student group explored a specific design research question:

- How to optimize logistical workflows while ensuring effective communication and coordination between departments?
- How to address integrated task interruptions that contribute to caregiver fatigue and hinder task resumption?
- How to manage the accumulation of task interruptions in order to reduce the risk of medical errors in radiology?
-

In the period between each session, students were at liberty to contact the professionals as frequently as was required in order to enhance their knowledge and gain a more profound understanding of the environment and its constraints.

After a feasibility study and a selection made by the general directors of the hospitals leading the project and the team of caregivers responsible for the project, a study will be conducted to assess the relevance of the proposals on the basis of the evaluation criteria that will be identified by the teams from the 3 sites.

Three key research axes are being considered to evaluate the proposed design solutions:

- Workload and cognitive load: What is the impact of the solutions on caregivers perceived mental load, particularly in terms of reducing irritability caused by interruptions and promoting a greater sense of calm and well-being in the workplace?
- Consideration of the person initiating the interruption. This axis explores whether the solutions provide meaningful responses and foster more empathetic interactions.
- Communication with the patient: How do the proposed interventions influence the quality, clarity, and continuity of communication between caregivers and patients?

4. Discussion

Task interruptions are complex phenomena that require careful consideration of safety issues. In responding to the Design call for projects, the MERM teams and their referents sought to explore a different approach to this problem, with a view to identifying new solutions.
In this project, although the needs of users were explored, the solutions were tested primarily through the prism of the reasons for seeking them. The potential risks to care safety associated with task interruptions were recognised, but further observation was required for MERMs. By conducting this observation on three sites in parallel, the participants (professionals and students) were able to focus the co-conception of design innovations on common findings. While problems specific to each centre were discussed, thes

Furthermore, consideration was given to the integration of the social, human and environmental impact of the solutions' interfaces. During the three successive stages, the following aspects were discussed:

- Experience of professionals and patients
- Care organisation
- Quality of working life
- Social responsibility via the environnemental dimension
- Risk prevention

In the context of this collaborative project, which involves design students, electrocardiography technicians and their colleagues, it is imperative that the solution is compliant with health and safety standards. The emphasis, therefore, must be placed on a simple implementation that facilitates the work of the carers.

"The concept of ethical design raises philosophical, political and social questions"(“Qu’est-ce que le design éthique?,” 2019) (Web, 2017). Ethical design invites us to question the way we approach design. In the hospital environment, the hierarchical structure is vertical. The place of each professional and the grade they occupy is therefore defined. The decision- making system is also vertical, with decisions made by managers and executives being implemented by healthcare professionals. The SPRITS framework, through its co-construction of solutions, transforms this system into a horizontal structure that respects the voice of each entity, including both designers and each stratum of the hospital hierarchy. The question therefore arises as to how hospital design can be integrated in order to foster this openness. While some American hospitals, including Stanford and John Hopkins, have been incorporating in-house designers for several years and are affiliated with a design school, the integration of hospital design in France is a more recent development. Consequently, it is not currently incorporated as a systematic condition, a method that facilitates results through an ethical approach to hospital design.
In the course of this collaborative endeavour, the caregivers were encouraged to adopt a more naïve stance towards the reflections and proposals put forward by the student designers. The posture exhibited a shift from a state of resolution and productivity to one of reflexivity and "out-of-the-box" thinking. In a reciprocal manner, the student

designers were required to heed the expressed requirements and to accord due weight to the voice of the caregivers. Consequently, the proposed solutions were developed through a collaborative conceptualisation process, whereby a common understanding of the issues to be addressed was established. During the various phases of the study, leadership was provided by the students during the initial observations and proposals, by the caregivers when they were required to contribute their expert view of the work environment, and by the teachers to facilitate understanding of mutual constraints (respect for innovative ideas, integration of constraints). Furthermore, the future designers had to adapt to constant changes in hospital teams and human resource constraints, with changes in project managers. It was imperative that sustainable solutions be formulated in order to adapt to these changes, thereby ensuring the long-term viability and independence from professional turnover.
The alteration of perspective is a method of facilitating leadership in design, with financial, ecological and ethical constraints being incorporated into the design project. This approach enables the contribution of ideas by designers and vice versa.

For the study conducted, four different professions were involved: healthcare managers, designers, caregivers specializing in medical imaging, and patients. Indeed, involving professionals from the outset of the project ensures greater adherence to the transformation of care practices and leads to more sustainable, ethical, and contextually relevant solutions. A concomitant investigation into the implementation of this SPRITS system in emergency imaging departments, focusing on task interruptions, will endow this project with an evaluative dimension. Consequently, the notion of co-design is not regarded as a foregone conclusion, a self-evident success, or an imposed ethical model that fulfils existing needs. The results of the forthcoming study will provide valuable insights into the impact of the selected solution.

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Designing for the New Old : A Study on Participatory Design in Empowerment Perspective for Healthy Aging Communities

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Abstract

In the wave of global population aging, age discrimination and stereotypes severely limit the perception and treatment of the elderly. This research aims to break traditional concepts, reinterpret the connotations of elderly health and well-being, deeply explore the internal resources of the elderly group, sort out the approaches and criteria of design empowerment, seek strategies to enhance the well-being of the elderly and promote active aging, construct an interactive model, and present cases of participatory design.

Research Objectives

1. Analyze elderly's problem-solving resources, build a database for design empowerment.
2. Clarify design's role, make an operable strategy.
3. Build a dynamic model for active participation.
4. Extract models from projects to guide care practice.

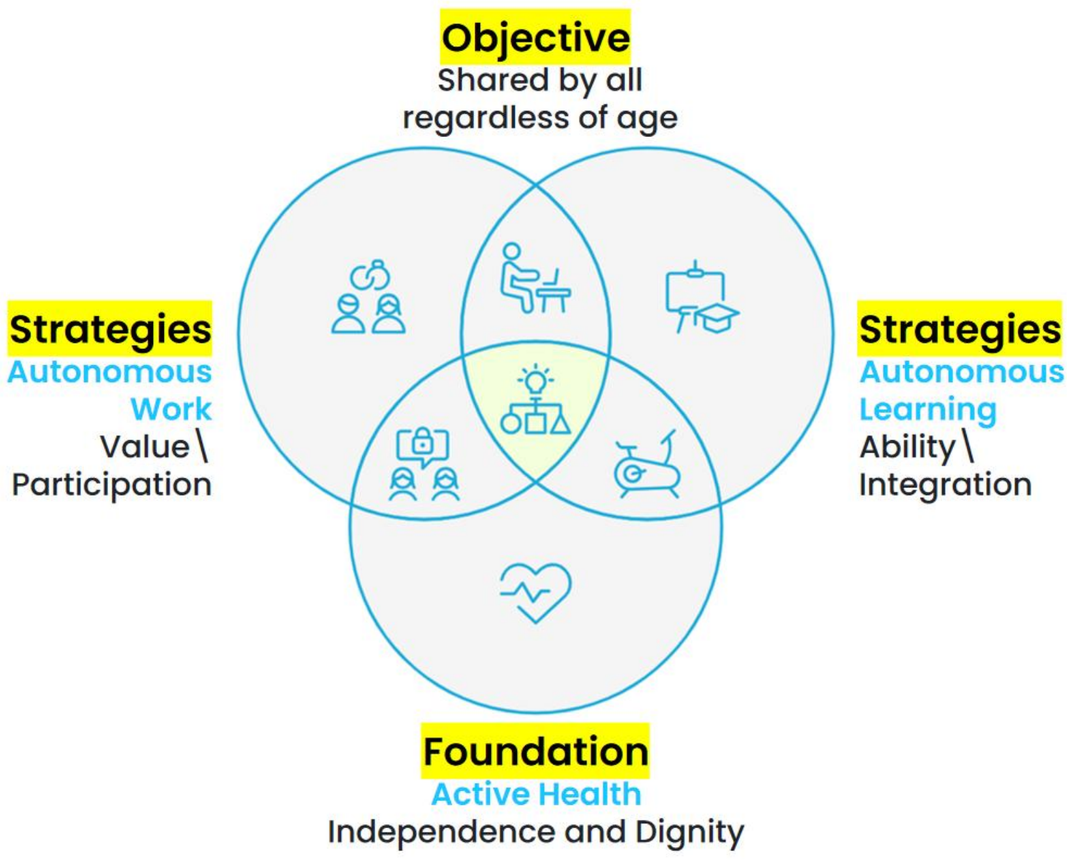

Figure 1 . Active Aging Strategy
Source of the picture.: Self-drawn by the author

Methodology and Tools

1. User Research Methods: Comprehensively employ methods such as in-depth interviews, observation, and questionnaire surveys to collect first-hand data .

2. Data Analysis Tools: Utilize statistical analysis methods to extract key information and identify advantageous resources and potential needs.

3. Design Practice Methods: Adopt the concept of participatory design and organize multiple stakeholders, to jointly participate in the design process.

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Research Process

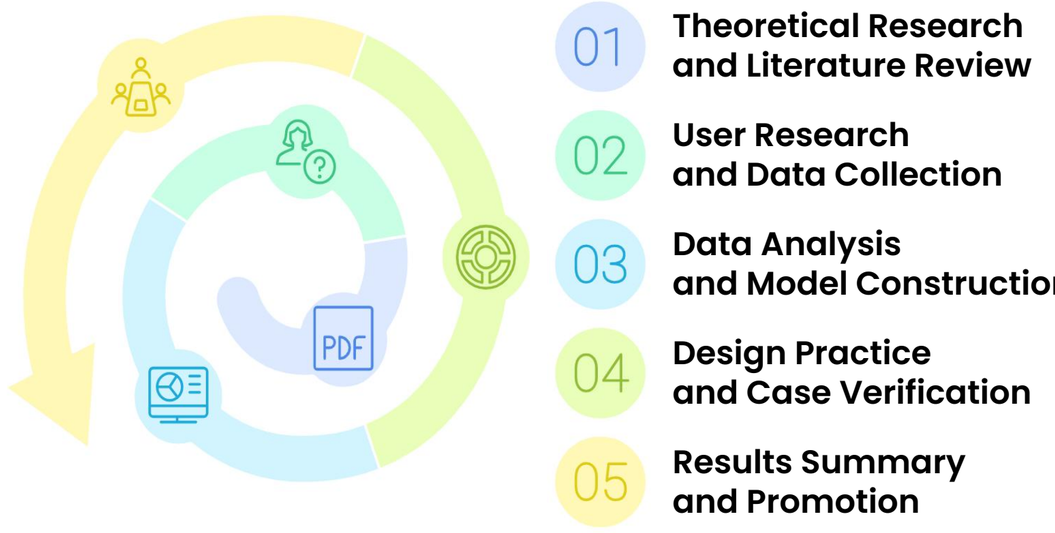

Figure2. Research Process
Source of the picture.: Self-drawn by the author

Design Participation: User Capabilities \Product Demands.
Elderly Empowerment: Elderly Skills\Participation Motivation.
Community Participation: Community Impact \ Participation Approaches.

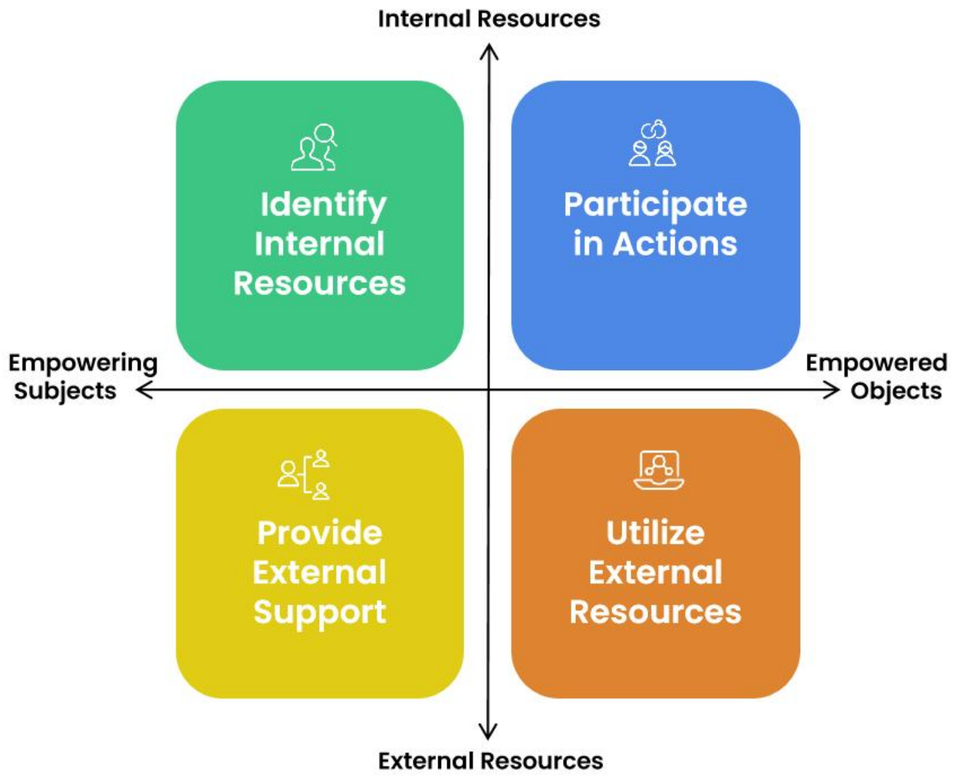

Figure 3. Resource Empowerment Framework
Source of the picture.: Self-drawn by the author

Expected Results

1. Theoretical achievements: Construct the advantageous resource system of the elderly group and the empowerment-participation interaction model.

2. Practical achievements: Develop a set of methods and process guidelines for participatory design in elderly care communities.

3. Social impact: Enhance the society's awareness and respect for the elderly group.

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DESIGNING INCLUSIVE PUBLIC POLICIES: ANALYSIS OF THE LITTERATURE

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ABSTRACT | This article examines the relevance of existing inclusive codesign methodologies for designing more inclusive public policies, in the current context calling for an inclusive transition. The semi-systematic analysis of a corpus of 37 texts reveals that these methodologies are anchored in an integrative rather than an inclusive paradigm, and therefore do not allow for an inclusive (re)design of public policies, towards an inclusive societal transition. Indeed, they do not allow for the representativeness of the entire ecosystem of stakeholders, nor the creation of solutions at the systemic scale of transitions. However, this analysis leads us to recommend working on the prefiguration phase of these inclusive participatory processes - in particular on the recruitment and alignment processes of participants - to adapt them to the scale of designing the inclusive transition of public policies.

KEYWORDS | INCLUSION, TRANSITION, DESIGN, CODESGN, METHODOLOGY

1. Introduction

The law of February 11, 2005 for "equality of rights and opportunities, participation and citizenship of people with disabilities" initiated a shift from the sole obligations of accessibility of the built environment to the more political question of inclusion: encouraging public services to rethink not only the accessibility of its institutions and services, but also their inclusiveness in terms of culture and processes (Ferdman, 2014). This inclusive transition (Ameri et al., 2020), calls for a collaborative redesign for more inclusive public policies.

However, a significant gap remains between “inclusive” legislative ambitions and the effective implementation of these public policies in the field (Ville et al., 2020), in various areas such as education, labor or social rights (Revillard, 2017). This gap raises questions about the design methodologies used to implement this inclusive transition. In the field of design, designers have developed so-called inclusive methodologies, such as inclusive participatory design methodologies also referred to as inclusive codesign: these approaches combine the viewpoints and skills of people with many different perspectives to solve social problems, with an emphasis on its accessible and/or inclusive nature (Szebeko and Tan, 2010). Although relevant, their application at the scale of design of public policies in a context of societal transformations has so far not been described, providing no guidelines for designers to meet the challenges specific to this context. Are these methodologies adapted to the implementation of the inclusive transition of public policies? If not, how can they evolve to respond to it?

This survey contribution (Wobbrock and Kientz, 2019) allows for the semi-systematic analysis (Snyder, 2019) of a literature review of 37 research articles on inclusive codesign methodologies. It explores how these respond or could respond to the methodological issues raised by the call to redesign more inclusive public policies. The combination of two analyses - 1) concerning the way in which participatory and inclusive methodologies respond to these issues and fit into an inclusive paradigm, 2) concerning the contemporary challenges they face - will enable us to suggest new areas of research and experimentation for inclusive design practices.

2. Inclusive transitions: emerging methodological issues for (re)designing public policies

The notion of inclusive transition refers to the concomitant process of transforming the medico-social offers and society, involving all stakeholders in these systems, so that people in vulnerable situations are accepted beyond their differences (Ameri et al., 2020).

This transition aims to switch from an integrative model where vulnerable people, even if they find their place somewhere, are put aside, to an inclusive model where everyone can find their place (ibid.). Accessibility standards are no longer enough: lived experiences have to be thought of as inclusive in their entirety, and more broadly, ecosystems must be inclusive both in terms of culture, and processes (Ferdman, 2014). Thus, the logic of “taking care” of people is replaced by a logic of revising organizations, including public policies, to include everyone (Ameri et al., 2020).

It calls for a broader logic of social transformation (Jones, 2018), concretely embodied in national public policies and their implementation. On a methodological level, it thus requires the design of systemic solutions, transforming current social or political systems to respond to complex societal situations (ibid.). The design of solutions at this scale relies on the participation of a variety of actors representing the entire social system examined (ibid.). Existing codesign methodologies must therefore be functional or adapted to this scale.

Designing solutions at the scale of societal transformations such as inclusive transitions involves the implementation of long-term processes (Ameri et al., 2020), to adapt to the pace of change of the stakeholders. It demands long-term commitment of those actors, and thus requires considering codesign methodologies on a processual and temporal scale (Mosleh and Larsen, 2020; Saad-Sulonen et al., 2018).

To (re)design public policies in the light of inclusive transitions, codesign methodologies must therefore respond to these different challenges: being anchored in an inclusive paradigm, questioning systems and designing solutions on this scale, integrating all the actors representing the ecosystems concerned and finally adapting to the long timescales of transitions. We suggest examining the existing inclusive codesign methodologies through these lenses.

3. Methodology

To study the relevance of inclusive codesign methodologies for implementing the inclusive transitions of public policies, we conducted a semi-systematic review (Snyder, 2019) of 37 scientific articles. They were selected according to the PRISMA reporting checklist approach proposed by Moher et al. (2009), based on the search terms “participatory”, “inclusive”, “accessibility”, “disability” and “design”, in French and English. We kept only the articles that concretely described the use of inclusive codesign and went beyond theoretical discussions. The analysis of the remaining articles made it possible to distinguish two corpus (figure 1):

- [corpus 1] describing the implementation of participatory and inclusive methodologies (30 articles),
- [corpus 2] describing the challenges of these participatory and inclusive practices (7 articles).

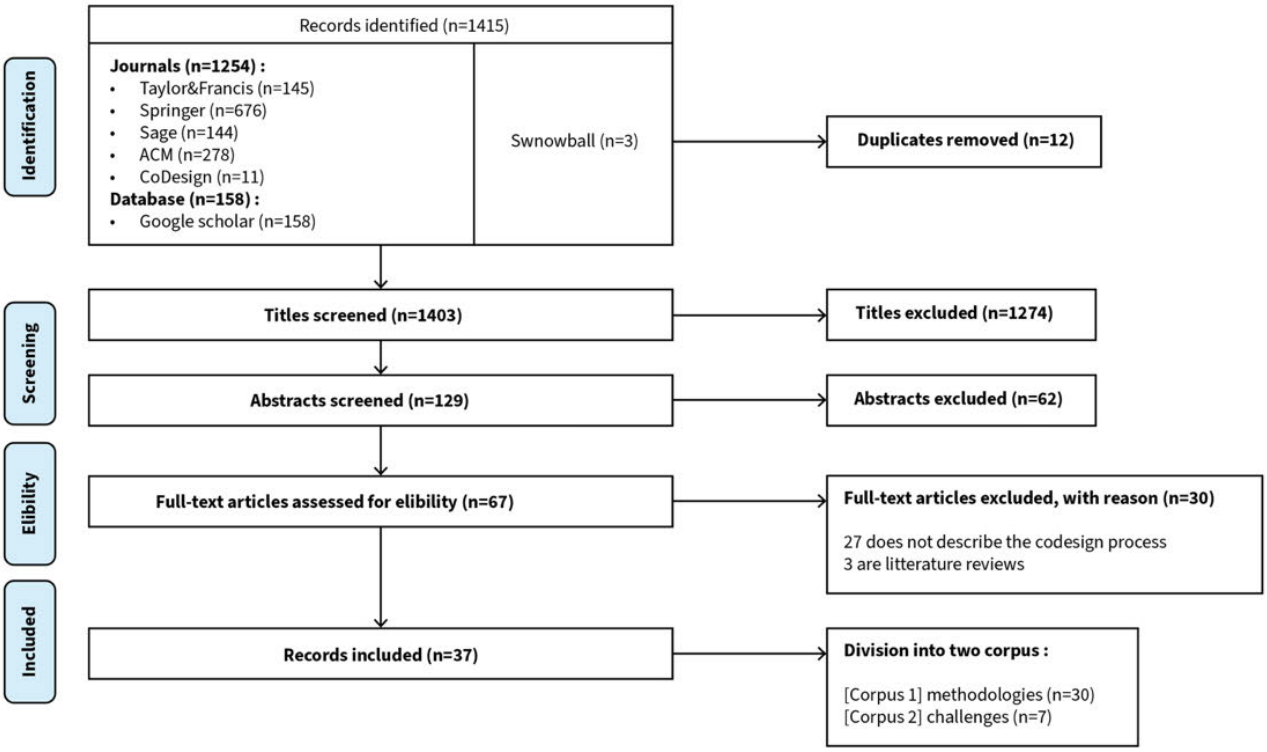

Figure 1: PRISMA flowchart of the review of articles

The various inclusive codesign methodologies presented in [corpus 1][1] were studied using a structured data extraction grid, based on four main criteria extracted from the emerging methodological issues for (re)designing public policies: (1) the scope of stakeholder involvement (e.g., limited to disabled persons and professionals vs. broader publics); (2) the nature of the design activities (e.g., whether they question systemic dimensions); (3) the type and scale of deliverables produced (Jones, 2018); and (4) the temporal framing of participation (as isolated events or part of ongoing processes) (Bødker et al., 2017; Saad-Sulonen et al., 2018)[2]. The thematic analysis (Charmaz, 2008) of these data aimed then to identify their paradigmatic orientation (integrative or inclusive) and assess their relevance to the implementation of inclusive transitions.
These results were then put into perspective with an analysis of the literature listing the challenges that these methodologies must address today [corpus 2]. This analysis took the form of a phasic analysis, aimed at providing designers with a set of points of attention at each stage of the codesign process for inclusive transitions.

[1] [corpus 2] gathers 30 articles: Magnusson et al., 2018; Gupta et al., 2021; Mussi et al., 2021; Metatla et al., 2015; Okamoto, 2009; Sahib et al., 2013; Ramloll et al., 2000; Metatla et al., 2019; Hendriks et al., 2013; González et al., 2020; Gibson et al., 2020; Tucker et al., 2022; Hendriks et al., 2015; Heriott (2015); Wilson et al., 2019; Francis et al., 2009; Frauenberger et al., 2017; Makhaeva et al., 2016; Millen et al., 2011; Frauenberger et al., 2011; Gaudion et al., 2015; Wilson et al., 2015; Bircanin et al., 2021; Hyett et al., 2020.

[2] Due to the short length of this working paper, only the results of the analysis will be presented, not the data extraction table.

4. Results [corpus 1]: methods that are not anchored in the paradigm of inclusive transition

4.1 Different codesign methodologies depending on the disability addressed

None of these methodologies take into account all the specific needs related to disability, while this is necessary in order to gain a global inclusive perspective. Indeed, each article addresses only one type of disability, often identifiable from its title, such as visual or cognitive disabilities (Metatla et al., 2015; Mussi et al., 2021). With the exception of one article (Hong et al., 2023), all the articles described only consider one typology of disability. This reveals a silo approach embedded in an accessibility paradigm, where methods are specific to each disability, rather than an inclusive perspective that would integrate solutions for all types of disability or cross-reference issues under the notion of “specific needs”."

4.2 Low diversity and representativeness of the actors of the ecosystem

The studied methodologies do not integrate the whole diversity of typologies of actors necessary for the design of inclusive public policies. Indeed, the analysis of the described participants reveals that there are four combination of actors:

- people with the same disability (14 articles),
- people with the same disability, accompanied by a member of their family or caregivers (3 articles) or a researcher (8 articles),
- a mix of actors: people with the same disability and other actors of the ecosystem (2 articles),
- a combination of actors of the ecosystem, without people with disability (7 articles).

Only two articles (Hong et al., 2023; Gaudion et al., 2015) present a combination of actors with disabilities and other actors of the ecosystem. However, even if they tend to respond to the necessary diversity of actors for transitions (Jones, 2018), they only integrate actors from the same typology of disability and offer too little representation of the actors in the ecosystem: they only involve designers in innovative projects, and carers or therapeutic actors (medico-social sector), but no actors from the ordinary environment.

4.3 Codesign activities that do not question systems on their whole

The codesign activities presented in these articles do not allow for collaborative reflection or redesign of the public policy system as a whole. Indeed, the majority of articles (22) present codesign activities such as testing solutions (method, tools, services), providing feedback or prototyping a new solution. Participants therefore only intervene at the end of the process, when the work areas, or even the solutions, have already been selected or produced. Two articles (Hyett et al., 2020; Herriott, 2015) present more comprehensive approaches: sharing experiences, choosing a problem and co-creating possible solutions. Although these approaches tend towards being more comprehensive and inclusive, codesign activities do not allow the participants to analyze the systems in their entirety, to determine the issues and imagine systemic solutions.

4.4 Deliverables that are not on the systemic scale of public policies towards inclusive transition

Most of the deliverables outlined in the articles do not tend to support a systemic change in favor of more inclusive public policies as they are not themselves systemic solutions. The study of the deliverables of the different codesign processes, according to the four design domains (Jones, 2018), reveals indeed that the majority of these processes proposes deliverables of the 1st domain -artifacts (12 articles)- and of 2nd domains: products and services (24 articles). Only one article describes potential deliverables in between the 3rd and 4th domain: the improvement of social connections between actors through organizational design in a medical institution (Herriott, 2015). None of these methodologies are thus described as intending to produce 4th domain -or social transformation- deliverables.

4.5 Codesign as an event not anchored in the temporal perspective of transitions

The articles mainly mobilize codesign methodologies as design events or activities (Bødker et al., 2017; Saad-Sulonen et al., 2018) (18 articles), rather than as broader temporal processes developing over time (Saad-Sulonen et al., 2018). This vision of codesign as a long and evolving process is nevertheless necessary on the scale of global transitions such as the design of more inclusive public policies. The few articles (9) tending to consider codesign as temporal processes only detail the classic “project” phase and do not or barely address the preliminary stages of the project (“pre-project” (2)) or the post-project stages (0).

The analysis of [corpus 1] thus reveals that existing inclusive codesign methodologies are not adapted to the design of inclusive public policies in the current urge for inclusive transitions. Indeed, they do not offer an inclusive global perspective as they are specified according to each "families" of disability, they do not allow for the representativeness of all the actors of the ecosystem, and the proposed codesign activities do not allow for collaborative questioning of the entire system studied, nor do they produce systemic deliverables, however necessary to carry out transformations at the scale of public policies. Finally, they are not anchored in a long-term perspective of societal transformations.

5. Results [corpus 2]: Towards the *prefiguration* of codesign processes

In parallel with the previous analysis, we carried out a chronological analysis - called phasic (Saad-Sulonen et al., 2018) - of the second literature review concerning participatory

and inclusive methodologies, describing the current challenges they face [corpus 2][3] or avenues for improvement. This phasic analysis allowed us to adopt the processual and temporal perspective of the methodologies (Mosleh and Larsen, 2020) prescribed for transitions (Ameri et al., 2018). In light of this perspective, the first salient point is the need to focus on the pre-project phase: the prefiguration of codesign processes, which seems to concentrate most of the methodological issues (Figure 2). Indeed, Eyraud et al. (2018) recall the need to collectively plan participatory processes in the most inclusive way possible (Eyraud et al., 2018).

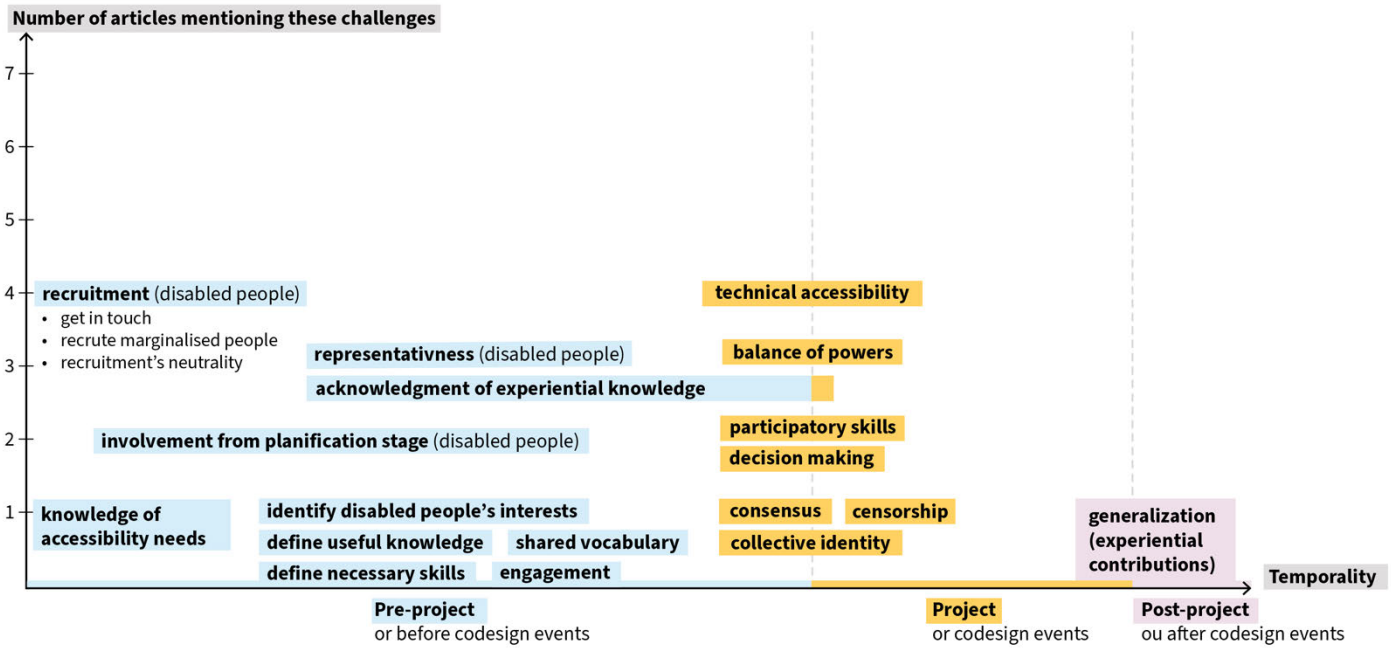

Figure 2: phasic analysis of inclusive codesign methodologies challenges mentioned in [corpus 2].

Two major prefiguration challenges stand out:

- Recruitment of people with disabilities is the most commonly described challenge. The authors indeed describe the issues of mobilizing and accessing audiences other than the usual people (Eyraud et al., 2018), the most willing participants, the usual suspects (Chinn and Pelletier, 2020) or even the "super-users" (Moll et al., 2020). To this end, they share the difficulties of finding new ways of approaching people with disabilities, who are not easily accessible (Eyraud et al., 2018). Recruitment issues also raise questions of representativeness: the authors share major questions such as how can people with disabilities be represented or represent themselves (Eyraud et al., 2018), and how can we counter the assumption that they might be representative of a wider group (Bradbury-Jones et al., 2018)?
- The second most important challenge seems to be related to the planning and alignment phase. The authors indeed describe the necessity for participatory identification of needs and interests (Eyraud et al., 2018). They suggest that everyone, including people with disabilities, should be able to take part in defining their needs and interests (Eyraud et al., 2018). To do so, they also point out the

[3] [corpus 2] gathers 7 articles : Eyraud et al., 2018 ; Chinn and Pelletier, 2020 ; Moll et al., 2020 ; Bradbury-Jones et al., 2018 ; Arévalo Arboleda et al., 2021 ; Arnal and Haegel, 2019 ; Nimbley et al., 2024).

importance of sharing a common understanding of the vocabulary used (Arévalo Arboleda et al., 2021).

6. Recommendations

This semi-systematic study revealed both the limitations of participatory and inclusive design methodologies for implementing the inclusive transition of public policies [corpus 1], and the prospects for improving them [corpus 2]. It showed that:

1. Participatory and inclusive design methodologies are not adapted to the scale of inclusive transitions: they need to evolve to include all “families” of disability or special needs, to include representatives of all stakeholders in the system, to challenge the whole system through codesign exercises, to produce systemic outcomes, all with a long-term perspective.
2. Most of the methodological challenges lie in the pre-configuration phase of the codesign process: improving the recruitment process (access to the audience and ensuring it is representative) and the planning and alignment stage (collective identification of needs and interests).

By combining these two analyses, we can formulate new recommendations for design research. Indeed, their cross-analysis reveals that adapting the prefiguration phase of the codesign processes could help respond to the methodological challenges revealed earlier [corpus 1]:

- Improving (broadening and refining) the recruitment processes could make it possible to involve a wide range of stakeholders representing the entire ecosystem needed to codesign inclusive transitions: people with multiple disabilities or specific needs, and public policy stakeholders, professionals from the mainstream environment, professionals from the medico-social sector and users, each of whom is not necessarily used to taking part in collaborative processes. This multiplication of stakeholders, each with different status and representation issues, complicates the recruitment phase.
- Working on the planning and stakeholder alignment processes upstream of the participatory processes could also make it possible not only to collectively question the system under study and thus be sure of creating solutions that respond to systemic issues, but also to frame the scale of the project.

However, answers to those challenges at the pre-project stage are little or not at all described in both [corpus 1] and [corpus 2].

New codesign tools, dispositive or methodologies are thus needed to 1) ensure an inclusive recruitment of various stakeholders representative of the whole social ecosystem 2) facilitate the alignment of their culture, interests and needs towards a shared vision of the future. It calls for new areas of research on the prefiguration phase of codesign methodologies, to scale up to the implementation of inclusive public policies:

- for design research: to study and describe more precisely the challenges of this stage,
- for design practices: to develop new recruitment processes and tools to implement an inclusive (re)design of public policies,
- for design education: to not only teach the accessibility norms, but also the characteristics of inclusive transition (as a systemic challenge) applied to public policies.

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Emergence of new funeral services in a global approach to care, from the dead to the living.

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ABSTRACT | Funeral rituals as we know them are tending to develop into other forms of funerals. This evolution raises various issues (land, economy, ecology, culture, design, etc.) that require the mobilization of numerous academic disciplines as well as civil society to rethink our rites and formulate new ideas about death (being dead, being a body, being alive). This article presents the premises of a collaborative research project, CODE. MO, "COmmun DEs MOrtels", funded by the TIRIS program of the University of Toulouse and led by researchers from the fields of design, law, archaeology, lighting sciences and a young societal impact company Coeo. This participatory research dynamic explores new ways of burial for a better environmental, economic, aesthetic and societal impact and aims to create knowledge that enables a better approach to death in French society, along three main axes:
- Health and well-being: Understanding and working on taboos and the invisibilization of the topic of death in society. Redesigning places and objects of remembrance (cemeteries, urns, etc.) and life paths (from life to death to life) in terms of care design and therapeutic renewal.
- Change and societal impact: Mapping, analyzing and measuring the impact (ecological, psychosociological, economic, symbolic) of the current path of the deceased. Development and visualization of pathways to death and alternative pathways with greater impact for the future. Comparison of existing and new funeral practices.
- Sustainable transitions: accelerating sustainable transitions in mobility, energy, resources and industrial change by co-constructing decarbonized burial modalities, proposing new scenarios of use and reformulating our philosophical, cultural and ethical relationship with death.

KEYWORDS | CHANGE MANAGEMENT, DESIGN FICTION, FUNERAL DESIGN, SOCIAL INNOVATION, INTERDISCIPLINARITY

1. Introduction

1.1 Funeral practices and care

Funerary practices are based on ancient rites that are passed down from generation to generation. These rites transmit a cultural and religious heritage that participates in a history of death and dying. They do not seem to have undergone any major evolution for more than 100 years; the introduction of cremation is the last significant innovation in the recent history of funeral practices (Berchoud, 2007). The moments surrounding death (end of life, funeral, post-mortem events) are much more than a simple farewell. They embody complex mechanisms for preserving memory, both individual and collective, and for coping with loss. In his study on anthropological interpretations of funeral rites, the anthropologist Jean-Pierre Albert (Albert, 1999) demonstrates the importance of funeral rituals for the preservation of collective memory and the essential role of these practices in the transmission of memories and family values.

In what is considered a "classical" scenario, a person's body disappears after death in favor of a burial that becomes a witness to his past life, his human life, which now takes place in the state of the deceased. The traces that the deceased leaves behind (images of the corpse, body remains, burial, objects, anniversaries, etc.) form the testimonial data of the deceased after the funeral has taken place. This collection contains not only physical and geographical traces of existence, but also memories, emotions and relationship and identity connections (image of the dead and emotional charge of the living).

According to the research of sociologist and anthropologist Gaëlle Clavandier (Clavandier, 2009), the body is the material receptacle of individual and collective identity and its preservation therefore has a deep symbolic meaning. The dead person no longer resembles the one we knew. Seeing the dead, expressionless and colorless body is a unique experience that is difficult to describe. Hearing, smelling, touching are some other verbs of sensory actions that are important at the time of the funeral so that the living can keep the person alive in their image and try to erase the corpse by allowing the subject to persist.

In contemporary Western funeral rituals, the care of the dead is important. This care often begins with the care of the deceased body, then with the witness of the living before, during and after the funeral, and finally with the spaces of contemplation and remembrance. These three main stages of the rituals (there may be others) testify to the collective desire to preserve the body of the deceased as a "place of remembrance" and

a "place of commemoration". The treatments are practiced in different ways.

The care of the corpse includes, for example, the intervention of the embalmer, the preparation of the corpse, the mortuary baths, the dressing and embellishment, the gathering of the group around the deceased, etc. These rituals help to construct the dead body as a "place of memory", that is to say that they make it possible to manifest and archive the identity components of an entire life at a certain time – in this case the transition from death to funeral – that one wishes to manifest and preserve through the presentability of the deceased. One could conjure up the idea of a representation of the body through a "witness image", that is to say an image of the deceased that, thanks to care, presents and represents for the living as close as possible to what he or she was before death. However, there are also other rituals to transfer the deceased body into memory.

The choice of a coffin, for example, its padded fabric in which the corpse is placed forever; the choice of granite or marble stone to make the tombstone or the powdered clay for the urn, the investment in a cemetery plot are all actions that show that rituals are not just about caring for the dead body. The question of the place where it remains after death is also important in order to bear witness to the past life (the cemetery house, the final resting place, etc.). The "place of memory" attributed to the dead is the place of visitation, contemplation, remembrance and sometimes the erasure of suffering. The funeral and its decorations are part of the funeral rituals and connect the dead with the living, who care for the place and bring it to life just as much as the deceased. In this sense, caring for the dead means caring for a body, a space, but also for the living.

Carrying the administrative and managerial burden of the moment, successfully organizing a funeral in the image of the deceased, or buying a costume especially for the funeral, participate in a form of respect for the deceased as much as in a form of care for the living. These actions are probably part of a "remembrance of places and beings". The rituals of the last moments, where the body and the spirit of the other intermingle (through the vision of the dead body or through the memories of one's own life, through the identity given to the funeral, etc.), are centered on the bodies and spirits of the bereaved. These rites are about moments - the past (memories of life), the present (moments of funeral) and the future (after body, after death); about the other state (life-death-life); but also about space and especially about dwelling (from the house of the dead to the cemetery as a new home). But these rites also manifest themselves in the care of the emotional and symbolic part of the living, that is to say of the living bodies (how to dress to respect the dead is a question often asked by people who have to go to a funeral).

Death does not mean the end of responsibility towards the deceased. The actions performed after death, such as washing, dressing or funeral, as well as the quality of the place where the body is laid out, can constitute decisions and actions that are supported by a form of ethics. These ethics – of presentation, of image, of space and of the moment – also show that the living have a strong aesthetic significance when a person dies.

1.2 Funeral ritual: ethical and/or aesthetic?

Funeral rituals that stage death through the display of the body of the deceased provide a context in which the question of sensibility can be explored and expressed. In his book "The Revival of Death", Tony Walter (1994) develops the idea that sensitivity to death and

mortality plays a crucial role in how individuals deal with loss and grief in Western funeral rituals. This position emphasizes the importance of everyone acknowledging and accepting the reality of death in order to facilitate a healthy and constructive grieving process on the one hand, and the need for individuals to be able to face their own mortality and that of their loved ones in order to take an ethical and aesthetic approach in these moments of burial on the other.
During the funeral rituals, people are confronted with the reality of death in a concrete way (visiting the deceased, displaying the remains, wishing to see him). The visual confrontation between the living and the body of the deceased is an essential aspect of the ritual. According to clinical psychology researcher Richard Paul (Paul, 2018), embalming not only aims to preserve the beauty and physical integrity of the deceased, but it also allows relatives to remember the deceased as they were when they were alive, thus facilitating the grieving process. The relationship to the dead and thus to death is therefore closely linked to the way society deals with the post-mortem body. This narrative reflects fundamental and collective values and beliefs regarding life, death and human dignity. While the visual confrontation between the living and the body of the deceased is an essential aspect of funeral rituals, Gaëlle Clavandier emphasizes that the respect and care given to the body of the deceased in funeral rituals testifies to the value placed on human life and the memory of the deceased (Clavandier, 2009). By acknowledging and accepting the reality of death, individuals can begin a meaningful grieving process and find meaning in their loss. In addition, this encounter allows loved ones to face the reality of death and express their farewell in a tangible way. However, the confrontation with death can also evoke a complex range of emotions in the ritual participants. The sight of the lifeless body can evoke sadness, fear and even disgust, reflecting, to quote Walter, "the tension between the bond with the deceased and the awareness of their mortality" (Walter, 1994). The presence of the dead body can serve as a catalyst for reflection on one's own mortality. It encourages the living to come to terms with their own feelings of impermanence and finitude.
For all these reasons, the study of the modalities of care and their impact on sensibility may amount to questioning the ethical and aesthetic approaches associated with the representation of death by centering the analysis around a central object, the body.

2. Research question

2.1 Contextualization

According to a study by the Research Centre for the Study and Observation of Living Conditions (CREDOC), there is a growing trend towards secularization and personalization today. Attitudes towards death are tending to be updated (Lehuédé and Mathé, 2024) and funeral rituals as we know them are evolving in a global desire for an evolution of care towards other forms that are more ecological, economical and aesthetic. Burial rituals as we know them are the subject of much debate today. The turn towards other, more ecological, more economical and more aesthetic forms of burial in a global effort to further develop the treatment of the dead, the bodies and the living is a path that is considered in this study. The evolution of funeral practices is indeed a major societal issue (respect for the will, problems of land ownership and overpopulation, multiculturalism and multiculturalism, etc.) that requires the mobilization of numerous academic disciplines as well as civil society (local authorities, funeral actors, families) to rethink our rites (dead, bodies, living) and to create new knowledge and new ideas.

Academic research is therefore now linked to entrepreneurial projects that question the human being as an actor, his environment as a recipient and our notions of death as beliefs.

2.2 Positioning in relation to the state of the art

The topic of death is often dealt with in the humanities and social sciences, but also in the fields of law, life sciences, design and urban planning. Nevertheless, the publications often remain confined to their disciplinary field and the contributions allow for little cross-fertilization and more or less situational experimentation. Furthermore, current contributions are limited to a topic-specific introduction and sometimes lack a critical knowledge base (George, 2002), (Nickpour, 2019). For this reason, the collaborative mode of research has been initiated here, linking academic research with collective and federative issues of the funeral sector and users in an active process of meaning seeking, meaning making and meaning taking (Holloway et al, 2013). These "meanings" given by John Holloway question the individual as actor, their environment as recipient and our representations of death as beliefs.

In this context, a working group has been set up that brings together various disciplinary approaches as well as Coeo, a young company with a societal impact since 2023. One of the actions of the Coeo approach is presented here in the context of the CODE.MO project, "COmmun DEs MOrtels", which involves some of the academics mobilized by the company (mainly from the fields of design, law, archaeology and lighting sciences). Indeed, in order to develop the present remarks in the field of design, it is necessary to show the authors' proximity to the initiative led by Ms. Chenuet and Ms. de Rauglaudre (Coeo) in the context of an entrepreneurial approach that they intend to develop around "funerals inspired by nature through new funeral gestures and rites".

CODE.MO. is one of the actions that are part of a global approach. It aims to create an overarching knowledge on the subject in order to gain shared insights that will allow the approach to death to evolve; French society is considering lifting a legal obstacle to the implementation of new funeral modalities. This global, collaborative and partnership-based research dynamic therefore involves researchers, lecturers, doctoral students, students and civil society (local authorities, funeral and social innovation actors, users). The project, which is funded for one year (2024-2025), cannot address all issues related to death in terms of its temporality - a project often lives at the rhythm of project calls. Therefore, this article focuses on the more specific perspective explored by the field of design, a transdisciplinary discipline that places the user at the center of considerations, in its cross-fertilization with the knowledge of others (law, anthropology, Coeo) and in the perspective of future cross-cutting themes (hypotheses and divisible themes).

2.3 Questions of co-research

In order to find new ways of caring for our dead (treatment, gestures, collective or individual celebrations, representations, languages, design of places and objects, etc.), collaborative research is essentially interdisciplinary and inter-scientific, decompartmentalized and participatory, in order to respond as effectively as possible to the problems of civil society. Points of convergence around common observations and problems thus form the basis of the approach. After several structuring steps for the project, the authors argue in favor of outlining some avenues for current and future research. These avenues reflect the state of the questions that are now being considered

in CODE.MO. and that the design addresses. They address the problem of the representation of death through three approaches: the paths of life to death and their places, the representation of death/the dead and their images, the aesthetic characterizations of death by the living and through their moments of use.

The existence of a demand for other forms of funerals is one of the entries that raises questions here. Such a request presupposes that the rites and places dedicated to burial are not perceived as satisfactory or appropriate by some of our contemporaries. Is such a feeling real? Are there precedents for it? Are there other cultures or human societies that have judged their own rituals to be inappropriate? Only a cross-research can shed light on this question. In our environment, burial sites are not the only ones that are perceived as inadequate. For the anthropologist Marc Augé, for example, a whole series of places are experienced in this way and form a category of their own, the non-places. In his view, non-places are disused spaces with no aesthetic quality (places of passage, rest areas, train stations, etc.). These spaces play an important role in social life, but their image is hardly valued. So are burial and death spaces therefore felt and experienced as non-places? It is a hypothesis which, thought out on a geographical level and according to uses, makes it possible to position it in the contemporary relationship to urban spaces. Moreover, the notion of place, which would indicate a kind of geolocation of death within the city, evokes the question of the way or the path. The deceased is indeed mobile, as funeral rites often take place on a journey (from hospital to home, from mortuary to cemetery, etc.). This mobility characterizes both the crossroads of the deceased and those of the living who accompany him.

In order to answer these questions, a cross-sectional study is underway to examine and analyze the professional career of the deceased. It is carried out through questionnaires and interviews with various actors (bereaved, health and funeral professionals, people who have no experience of the subject), as well as by analyzing the territories of death, collecting and recording data in situ (in places at the end of life, from care rooms to cemeteries). The main challenge is to model, through testimonies and field studies, the different scenarios of use of the journey of the deceased and to identify ways of developing and changing practices, i.e. the emergence of new technologies, ways of living or forms of dying.

The image of the dead that we receive through experience and memory is multifaceted. What do we remember in the moments of the funeral? How do we imagine "becoming dead"? Do the rites impose images of the deceased on us or what images do we imagine of the dead after the rites? These questions concern both the connection between lived experience and imagined experience as well as the representation of a form of aesthetics of death or "after death". Against this background, an axial cartographic modelling was begun. It makes it possible to reference images of death, especially representations of the dead, in different media (community sites, personal photographs, drawings of expression, AI generativity, etc.).

In this approach to the image, the perspective that would give rise to the call for "an ecology of funeral" is another common entry that raises questions. As the question of the impact of current practices (social, environmental, economic) is present in research discourses as well as in local policies and businesses, a cross-cutting research on the values and feasibility of alternative ways of funeral is currently underway. The latter generates new logics and beliefs that affect the representation of the dead body as well as burial sites or memorials. In this part of the project, the collection of data through mapping will be a visual support that can point the way to new imaginaries. What are the possible or dreamed alternatives to "return to earth or dust"? How can we represent and

present the dead body differently?

The challenge, then, is to know how to materialize and then democratize and rethink our modes of funeral. Design as a vehicle of fiction and soft innovation is of public utility to set the levers in motion in relation to our representations. Moreover, the comparative and prospective study aims to link knowledge (law, anthropology, history, biology, politics) to envisage new forms of burial and visualization of death by deploying legal and regulatory tools and analyzing different existing/emerging protocols through comparative law.

Aesthetics and the aestheticization of practices is a final point presented here, bringing together the leaders of the CODE.MO project. As CLMF design (color, light, material, finish) is a field of research being worked on by some of the authors, the senso-chromatic characterizations of the previous research directions are explored, as well as the use of color and its impact in funerary practices. What are the colors of death and dying in France today? What chromatic states do we pass through on the journey from life to death and from death to life? Do the living mourn in black, as history would have us believe? Can CLMF design help the living in the face of death? These questions, born from the feedback and already identified in the initial survey data, form a concern that places the aesthetic characterizations of death in the place of a possible lever for a better acceptance of separation and disappearance.

To answer these questions, a study of "objects" in the broadest sense of the word is analyzed (from the dying and then dead body to the elements that adorn or evoke the presence of the deceased in the various places envisaged in the first entry of the program). These elements that punctuate the path of the funeral, which may seem anecdotal given the gravity of the event, are, it seems to us, the reflection of our practices and our customs, our micro-cultures of mourning and, finally, of a form of care through the search for a form of beauty. What is the real situation? The problem of such a question lies in the individual's ability to project aesthetic qualities through various "objects" that form traces, clues, memories and memory in moments of drama. By cross-referencing regulatory data and historical practices in addition to the current CLMF analysis, the analysis will therefore search for the identity palettes of death and their possible renewals in our future funerary practices through the passages on surveys, referencing and then counter-types.

3. Emerging axes

The problems identified are mainly conceptual, legal and political, epistemic and paradigmatic.

Conceptual problems include the inability to define death in order to accept it as a fact of daily life; the neglect of the distinction between quality of life, quality of death and quality of places at the end of life; the lack of visibility and aesthetics of practices to think the rupture as a "global and personalized project". In this phase, the question arises as to the forms that the burial system takes (design of burial places, spaces and objects, scenarios of practices and experiences at the end of life and death, etc.).

The legal and political problems are related to the fact that burial today takes place in the ground or in ashes. In the USA and Germany, however, new, more ecological burial methods are being developed, such as humusation (terramation or natural organic reduction). This practice is the subject of several scientific publications, in particular on the biological process, the absence of pollutants or contaminants. To date, these

procedures cannot be transferred to France as they cannot be carried out with a coffin, which is currently mandatory. An ANR project called "F-Compost" is also underway with the aim of "co-designing and testing, under real conditions, funeral processes for composting in a natural environment" (CODE. MO is already in exchange with the "F-Compost" project thanks to the work of the Federation around a common dynamic led by the company COEO - Laboratory of Social Innovation of the Funeral Industry). This phase raises the question of the acceptance of other forms of burial (locks and levers for the psycho-sociological and legal acceptance for humusation, communication and the philosophy of dying, etc.).
The epistemic and paradigmatic problems here include the lack of a unifying and overarching instrument to promote shared knowledge. Research into new ways of burial with better environmental, economic and societal impact has led researchers from the fields of law, design and anthropology to join the CODE.MO. project. The cities of Toulouse and Paris have expressed their interest in becoming pilot areas for new funeral services (for humans and/or pets). It is thus the conceptual and practical proliferation that raises questions here to highlight the articulation of sciences and their disciplinary methods in order to jointly construct a reference tool, a common good on the subject. This raises the question of the formulation and reinforcement of the problems previously identified.

4. Methods and preliminary results

4.1 Survey methodologies

In order to answer all these questions, a cross-sectional investigation (anthropology, design, law, civil society) has been underway since January 2025 to examine and analyze the career of the deceased. It will last eight months and will be conducted using quantitative and qualitative questionnaires as well as semi-structured interviews with various stakeholders (bereaved, health and funeral professionals, people who have no experience of the subject). A study on the analysis of places of death using color design methods, including the recording and collection of data on site (public and private places of death, care rooms, burial sites), matching and sensory and chromatic measurements complete the approach. Another part concerns the cataloguing of visual representations. This involves reviewing paper, digital, graphic or cinematographic archives to create a database that will feed the rest of the project. The preferred tool is visualization through axial, lexical and linguistic maps. A final paper surveys the existing literature to identify the strong and promising data within this collaborative research.

These investigations require considerable human resources and linkage and articulation with the actors on the ground. In this first phase, we favor a regional approach (around the metropolis of Toulouse) for places at the end of life (from care facilities to burial sites) that form a possible route or a set of possible paths. The identification and mapping of these paths is the first step and the prerequisite for the survey prior to the in situ study (development of the survey protocol). However, carrying out the survey depends on the accessibility of the site and permission to take photographs. The development of survey protocols must be accompanied by contracts with stakeholders to ensure that the surveys comply with the French RGPD. Public research institutions will take on the role of a trusted third party where appropriate.

4.2 First results

The first phase, conducted through a field survey across the Occitanie region using a semi-structured questionnaire with a quantitative focus, aims to collect individual perceptions of death, of the deceased, of one's own death, and of the funeral moment, in order to construct a collective image. Although the survey is still ongoing, we have analyzed the first 51 responses to identify emerging trends (fig.1). The average age of respondents is 38, encompassing all socio-professional categories, and includes individuals living in urban, peri-urban, and rural areas.

In response to the question "What does death evoke for you?", the primary concepts identified were that of an ending and the sense of an inevitable passage. Secondary concepts included a feeling of emptiness, the idea of renewal, a negative emotional register (sadness, fear, anxiety), as well as thoughts for those who remain and, on a different note, the body's decomposition. Other concepts were mentioned but did not yield significant occurrences in this context (change of state, idea of release, sensorial or chromatic evocations, immateriality, burial places and objects).

In response to the question "How do you imagine a dead person?", the primary concepts fell into the sensorial-chromatic register, bodily transformation, and paradoxically, immaterial entity. These were followed by notions of ending, emptiness, release, and references to burial places and objects, along with the idea of an inevitable passage and decomposition. Other concepts were mentioned but were not recurrent in this context (renewal, memory, circumstances of death).

In response to the question "How do you imagine your own death?", the lack of representation emerged first, followed by negative emotional responses, the idea of an ending, release, and the circumstances of death. Secondary concepts included the idea of an inevitable passage, concern for those who remain, burial places and objects, emptiness, and reflections on one's own funeral. Bodily transformation was mentioned but did not appear with enough frequency to be considered recurrent in this context.

Finally, in response to the question "What do you associate with the moment of the funeral?", the main concept belongs to the emotional register and is closely linked to sadness. Secondary concepts relate to rituals and the gathering of the living during the ceremony. These are followed by farewell, burial places and objects, memory, and the recollections loved ones have of the deceased. Other concepts were mentioned but accounted for only two occurrences, or none at all in the context of this question (such as the sensorial-chromatic register and the notion of ending).

Table 1. Occurrences of concepts according to the different questions.

	Representation of Death	Representation of a Deceased Person	Representation of One's Own Death	Representation of the Funeral
No representation	/	/	18%	/
Farewell	/	/	/	6%
Bodily transformation	2%	17%	2%	/

Circumstances of death	/	2%	14%	/
Decomposition	6%	4%	/	/
Emotional register	8%	/	12%	41%
Inevitable passage	14%	4%	6%	/
Ending	35%	8%	12%	2%
Immateriality	2%	16%	/	/
Burial (places and objects)	2%	6%	4%	6%
Release	2%	6%	12%	/
Memory	/	2%	/	6%
Thoughts for those who remain	6%	/	8%	/
Renewal	8%	2%	/	/
Gathering of the living	/	/	/	19%
Ritual	/	/	/	12%
Sensorial-chromatic	2%	27%	/	4%
Emptiness	8%	6%	4%	/
Other	5%	/	4%	/
Preferred not to answer	/	/	4%	4%

Four levels of occurrence can be observed among the identified concepts :

- Primary concepts: emotional register, ending
- Secondary concepts: inevitable passage, sensorial-chromatic register, bodily transformation, release, gathering of the living
- Tertiary concepts: absence of representation, circumstances of death, immateriality, burial places and objects, thoughts for those who remain, ritual, emptiness
- Complementary concepts: farewell, decomposition, memory, renewal

This conceptual hierarchy suggests a collective representation of death that is

predominantly negative, marked by a strong emotional register. The presence of loved ones then appears to hold particular significance, as does the appearance of the deceased's body. Finally, the lower level of concepts reveals either a lack of anticipation of what comes after death or a minimal degree of foresight. In such cases, social rituals as well as burial places and objects emerge as points of consideration for the respondents.

5. Scientific and societal objectives

The aim of the research is to enable policy authorities to overcome this obstacle by relying on three main pillars (health and well-being, societal change and impact, sustainable transitions).

The first is health and wellbeing. It is about understanding and promoting healthy living and well-being in order to lift the taboo and invisibilization of the subject of death in society, supporting all actors in the sector in a "must die" and anticipating new needs (socio-cultural and political), redesigning places of remembrance (cemeteries, ballot boxes, etc.) in the spirit of care design and nature as a therapeutic tool, and finding psychosocial levers for accepting the idea of a "softer" separation (tools and dissemination).

The second pillar focuses on societal changes and the impact of these new practices by examining global changes and their effects on societies. Mapping, analyzing and measuring the impact (environmental, psychosociological, economic, symbolic) of the current journey of the deceased (from death to final resting place) allows to create and illustrate paths to death and alternative routes with a better impact for the future, in parallel with a comparison of existing and emerging European funeral practices.

Finally, the third pillar focuses on sustainable transitions. The aim is to accelerate sustainable transitions in mobility, energy, resources and industrial transformation by co-constructing decarbonized funeral modalities such as humusation, by proposing new scenarios of use that connect humans and nature (emergence of greened memorial landscapes that comply with zero-phyto prescriptions, the emergence of biodiversity, green lungs and islands of freshness in the city) and by reframing our relationship philosophically, culturally and ethically in the face of death or loss.

6. Conclusion

While death is a universal phenomenon, it manifests itself in a variety of practices that reflect the cultural, social and philosophical values of a society. Funeral rituals not only have a symbolic and spiritual dimension, but are also an important societal issue in the face of changing expectations, beliefs and contemporary environmental challenges. At the heart of these reflections is design as a transversal discipline that makes it possible to rethink and renew funeral rituals in order to adapt them to new ecological, aesthetic and emotional needs.

Thus CODE.MO aims to bring about a change in the way we deal with death, mourning and remembrance by offering more sustainable and humane alternatives to current funeral practices. Through an interdisciplinary and collaborative approach, it aims to question the utility and impact of traditional rituals while paving the way for modalities that are more respectful of the environment and the diversity of individual and collective

aspirations. Investigating the "non-places" associated with the end of life, redefining the funerary space and exploring new practices such as humusation will make it possible to shake up the established codes and reinvent a funeral journey that is both respectful of ecological issues and meaningful.

The expected results of this research promise not only to influence the practices of tomorrow, but also to participate in a broader movement to take responsibility for death that integrates human, environmental and ethical dimensions in a sustainable way. Ultimately, the goal is to restore a just and thoughtful place for death and grief in our society, so that each person can be treated with dignity and respect in their passing, while the living have the opportunity to rebuild themselves in a grieving process that is more responsive to new needs and deeply connected to humanity and nature.

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ENTRY POINTS FOR DESIGN FOR POLICY: A FRAMEWORK PROPOSAL TO EMBRACE THE CONTEMPORARY DESIGN CULTURE IN POLICY DESIGN

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ABSTRACT | Policy design, design for policy, and 'policy design thinking' have influenced policymaking with interdisciplinary and heterogeneous perspectives from design and other disciplines. Whilst public sector policymakers seek creative, design-led methods and tools to enhance policy-making through a design thinking approach, design researchers and practitioners seek a recognised role within these processes. Even though these strands show blurred boundaries, a significant aspect is that they help to define a space of interaction between design and policy-making. Moreover, we see an opportunity to identify lenses that can help interpret, scale, and replicate various experiences within the broad context of policy design, encompassing different perspectives. We believe this is especially crucial for design practitioners and researchers in contexts where this field is not yet recognised and/or explored. Based on this assumption, the research question that this contribution tries to answer is: What framework can define ways to recognise or pursue experiences of design for policy? Methodologically, the authors defined a framework proposal through inductive reasoning, relying on ten years of academic research in design for policy, social innovation, and civic design to select cases. Qualitatively analysed, the selected cases drew our attention to three recurring patterns: (i) the transfer of design culture and expertise to policymakers and public sector actors, empowering non-design-experts to adopt a design-led approach in policy-making independently; (ii) the co-creation of knowledge within policy processes, epistemologically grounded in

co-design, through the Research Through Co-Design model; (iii) the transformation of a context by non-expert designers, intended as active citizens and policymakers who systematically design for policy. Translated into 'entry points' to the design for policy arena, also by means of comparison and connection to other cases taken outside the authors' research groups, such patterns are defined as follows: (i) transferring design knowledge to non-designers for policy-making processes, (ii) fostering knowledge co-creation among the involved actors in policy design, and (iii) recognising existing policy design processes led by non-designers through a design perspective. The framework is discussed with regard to its use as an analytical and strategic tool for positioning design possibilities of intervention within policy processes.

KEYWORDS | DESIGN FOR POLICY, DESIGN KNOWLEDGE TRANSFER, RESEARCH THROUGH CO-DESIGN, NON-EXPERT DESIGN

1. Introduction

1.1 Design and policy-making: an overview of an emerging and plural field

The connection between design and policymaking - in terms of design methods and approaches contributing to the development of public policies - is a subject of current scientific interest for researchers in the field of Design, as well as in Policy Studies, Public Administration and Management ones (Kimbell et al., 2023; Mortati et al., 2022; Van Buuren et al., 2020).

The first hints of this interaction date back to the 50s, when the term 'policy design' was coined in Policy Studies to express the idea of systematic calculation of policy problems, practices, and outcomes (Colebatch, 2018) and, three decades after, an innovative approach for effective policy-making (Peters et al., 2018). Henceforth intended "as a form of design" (Carlsson, 2004), policy-making began to be approached with design thinking as a rational guide for effective policy solutions, especially when tackling 'wicked problems' (Howlett, 2019). Practitioners and academics in the area of Design, on the other side, started exploring the policy field at the beginning of our century (Burns et al., 2006), experimenting collaborations with policymakers and civil servants in order to make better public policies and services - i.e. more capable of understanding public problems and addressing people's needs. In the last fifteen years, the concrete idea of a new area for design practice and research within this field emerged, being explored in various policy domains and through a diverse range of implications of design expertise and different roles for designers (Bason, 2014a; Kimbell et al. 2022; La 27e Région, 2010; Lewis et al. 2020; Mortati, 2019).

Within policy processes, design thus has gained recognition as a strategic lever to address the challenges policymakers are increasingly facing nowadays, characterised by high levels of complexity and uncertainty, and exacerbated by limited resources available to governments (Bason, 2014b; Kimbell et al., 2022). The contribution of design fundamentally lies in the introduction of human-centered and collaborative approaches, a systemic and transformative vision, and an openness to inquiry, experimentation and

prototyping (Bason, 2014b; Blomkamp, 2021; Kimbell, 2016; Kimbell & Bailey, 2017; Lewis et al. 2020; McNabola et al., 2013; Villa Alvarez et al., 2022). Cases in this field have appeared in all continents and at all administrative scales - ranging from local to national and supranational policies - and have concerned several policy domains and policy problems, mainly regarding social issues. Designers' intervention in these experiences varies in terms of contextual situations and policy stages, proving the possibility to take part in all phases of the policy cycle. Moreover, these cases show different degrees of institutionalisation: designers may collaborate with policymakers - for example, inside pluridisciplinary units as policy and public sector innovation labs - but also support grassroots-led policy processes or influencing policy outcomes through forms of design activism (Selloni, 2021; Tromp & Vial, 2023; Vaz et al., 2022; Whicher & Swiatek, 2022). Named in different ways - such as 'policy design' (Bebbington et al., 2022; Blomkamp, 2021; Johnson & Cook, 2014; Vincent & Thévenet, 2013; Whicher, 2020), 'design for policy' (Bason, 2014a; McAuliffe, 2023; Mortati et al., 2022; Rudkin & Rancati, 2020; Vaz et al., 2022), and 'design-led policy' (Blomkamp, 2021; Cairney, 2021; Schmidt & Mortati, 2024), *inter alia* - this "new" space of intersection between design and policy disciplines reveals an increasing but still emerging field of practice for designers and policymakers (Kimbell et al. 2022; Whicher & Swiatek, 2022). Its liability to lexical and semantic plurality (Curtabbi, 2025; Villa Alvarez & Wellstead, 2023), as well as its heterogeneity with regard to purposes, tasks, moments of design intervention, and relationships with institutions and policy processes, reveals this area as a spectrum of practices.

1.2 The challenge of recomposing the diversity of design for policy

The need to represent such diversity and recompose the fragmented knowledge on design for policy seems to be addressed by a few research contributions.
For instance, some researchers from the Public Management domain defined a set of three uses of design approaches in public administration: 'design as optimisation', 'design as exploration' and 'design as co-creation' (Van Buuren et al., 2020). In the authors' idea, the three modes correspond to different purposes: (i) making policy-relevant knowledge accessible to policymakers; (ii) adopting creative tools to help decision makers develop policy solutions; (iii) applying a participatory approach to the whole process of policy-making. One of these authors, together with other colleagues, developed a systematic literature review of consistent Public Administration publications, including one design journal (Hermus et al., 2020). Their work provides a two-level typology of design approaches in public policies: informational approaches and inspirational ones. The two clusters differ in content, context and impact of design - i.e. the use of knowledge, the situation in which design is employed, and the cognitive or practical changes evoked by design. Respectively, the authors claim that design in policy processes can be used with a theory-driven or synthesis-oriented approach, providing evidence or addressing users' perspectives, to create consensus or change.
A work worth mentioning from Design literature is the one by Kimbell et al. (2022), which enlightens the inner fragmentation of this research field, claiming that "differences in ontologies, epistemologies, methodologies, and contexts should be acknowledged", and suggesting the need for a cross-disciplinary investigation between Design and Public

Policy, within which "multiple conditions for, forms of practice and accounts of designing for public policy may emerge" (pp. 10-11). The research directions outlined by this analysis resulted in a broader publication, involving other colleagues from Design and Public Policy fields. Here, Kimbell et al. (2023) present a framework to differentiate the purposes, scopes and agents of design in policy-making, highlighting three relationships between design and policy. Design is presented (i) as "a tool for policy-making" to achieve specific goals and generate solutions, (ii) as a practice of improvising with policy-making and making it more open, or even (iii) as a way to regenerate its approaches. Different types and owners of knowledge are analysed within this framework: in the first case, design is adopted by both policymakers and professional designers, while in the second case, also policy takers contribute as co-designers, and, when "regenerating" policy-making, a more inclusive approach to knowledge is enacted.

Another relevant framework (even if referred to a broader scope than the policy realm) is the one by Brinkman et al. (2023), suggesting a series of strategies for applying design in a public sector context. The authors provide a taxonomy of strategic actions ascribed to four different strategic purposes: (i) building confidence in design; (ii) forming alliances with design thinking advocates; (iii) generating support and political buy-in; (iv) enhancing compatibility between design and the external context.

The analyses just mentioned confirm the demand for approaches that display the diversity of design for policy. They focus on design "agents"[1] and the contributions of design to policy-making processes, particularly in terms of knowledge production and impact on policy as a whole. More importantly, they describe the field as it appears in contexts where its related practices are well-established, resulting in frameworks that may not apply in countries like Italy, where design for policy is still emerging and limited to a few examples in academic research. Based on our research experience, it becomes clear that there is a need for an intermediate acknowledgement of the conditions enabling design for policy, before focusing on the full spectrum of design contributions. Hence, the research question which we attempt to answer through this paper: What framework can define ways to recognise or pursue experiences of design for policy? More precisely, we question the possible 'entry points'[2] allowing the recognition of existing

[1] Within Design literature, the term "design agents" is typically used to refer to those entities and organisations making use of design and embedding professional designers are often embedded, such as centres, associations, networks and clusters (Whicher, 20217) We use the expression to refer to all those actors who, in their professional roles, embody and exercise design practice, acting as *bearers* of design capability (Maffei et al., 2014; Muratovski, 2016). This includes not only professional designers, but also those who design as part of their profession or – as is often the case with civil servants and policymakers in the design for policy landscape – draw upon design tools and methods in their everyday work. We deliberately adopt this broad definition in order to later articulate, throughout the paper, the internal distinctions and implications arising when diverse actors – with varying backgrounds and intentions – engage in design competencies and approaches when making and innovating policies.

[2] For "entry point" we mean both a strategic opportunity and enabling condition for initiating a certain kind of process, and an analytical lens for identifying and interpreting that process, offering a new perspective from which to observe it. The concept of an "entry point" is widely recognised in computing, where it refers to "an address from which a program or subroutine is to be executed" (Collin, 2004). This analogy can inform our use of the term in the context of design for policy. In our

experiences of design for policy not yet labelled as such, and serving as a proactive approach to this new design field where it is not explored. In response, we propose a framework of three 'entry points' that complement rather than replace existing ones, creating new opportunities within those frameworks. This approach underscores the importance of considering how the 'posture' of design agents shapes the purposes and consequences of integrating design practices into policy processes.

2. Methodological approach

Methodologically (Figure 1), the three "entry points" framework mentioned emerges from an inductive process by analysing and connecting academic research, supplemented by further cases. We belong to two different academic groups having in common social design subjects and action-research initiatives both in the field of social inclusion, and belonging to two Universities placed in two different regions in Italy: the Innovation in Design & Engineering Laboratory (IDEE Lab) within the University of Florence, in Tuscany, and the Social Design Lab (SDL) from Politecnico di Torino, in Piedmont. SDL is mainly concerned with social cohesion challenges related to severe adult marginalisation, such as housing insecurity and food poverty among people experiencing homelessness (Campagnaro & Ceraolo, 2022). The group adopts a transformative and participatory approach, fostering alliances with local stakeholders, particularly Public Administrations, to engage in policy-oriented processes. In parallel, part of the team of the IDEE Lab is also engaged in experimenting with co-design, service design, as well as product-service system design for social change processes, collaborating with third sector entities and local public bodies.

Our two groups share a common interest in social design and design for policy. Through discussions, we recognised that the heterogeneity of our research experience was not easily identifiable within the design-for-policy arena[3]. This led us to a reflective process to determine whether we were already engaged in design-for-policy practices or how to actively participate in such initiatives. As a result, we initiated a collaborative reflective process (Figure 1) to explore our research question, focusing on how to recognise or pursue design-for-policy experiences. This process involved three stages: (i) collecting cases from

interpretation, the "address" signifies an access point—an enabling condition through which one may enter a design for policy process. Crucially, this entry point is not necessarily part of the process itself, but rather a situational or contextual factor that facilitates engagement with a design for policy setting.

[3] With the term "design-for-policy arena", we refer to the concept of the "action arena" introduced by Ostrom (2005), which encompasses both the "action situation" and the actors involved in it. Ostrom (2019) describes it as "the social space where individuals interact, exchange goods and services, solve problems, dominate one another, or fight." A similar use of the term "arena" in design has been recalled by Gaete Cruz et al. (2023) through the notion of the "co-design arena", which also draws upon Ostrom's framework. Accordingly, in this paper, the term "design-for-policy arena" denotes design for policy as a distinct and dynamic realm—understood in processual and relational terms. It refers to the space in which design practices and designers contribute to policy-making, and where interactions between designers and policy actors—such as decision-makers, policy implementers, and other stakeholders—take place.

our research groups based on direct experience or study, (ii) inductively identifying an initial pattern, and (iii) validating it with examples from other contexts. The following paragraphs detail each stage.

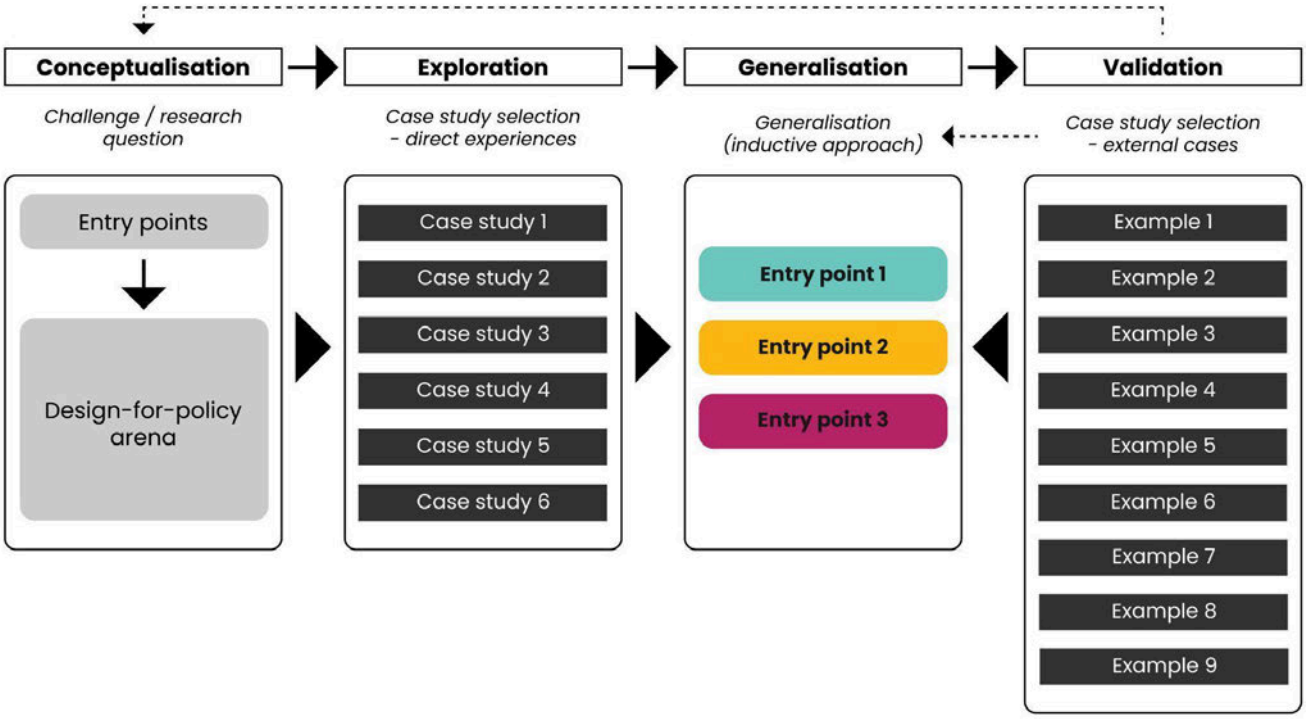

Fig. 1. Methodological approach applied to develop the framework.

2.1 Case collection

Based on our experience in design research, we selected cases according to the following criteria:

- They were carried out in the last decade and were either directly experienced or thoroughly studied by us.
- They were related to design research questions, involved design practice, or reflected specific design stances.
- They were linked to policy-making processes, including collaborations between designers, non-designers, public institutions, and policymakers, as well as involvement in other processes that directly or indirectly influence policy formation and implementation.

The collected cases, summarised in Table 1, vary in terms of topic, purpose, context, duration, designers' roles, and stakeholders involved. They include collaborations with both public actors and civil society organisations engaged in public interest functions, representing both explicit and latent policy dimensions. These diverse, often "hidden" examples were chosen not for being conventionally "successful" but for their potential to initiate a design-for-policy dimension, reinforcing the idea of plurality within the field of design for policy. The following are the selected cases.

Reorienting Turin's system of public services for homelessness

The first case study, launched under the National Operational Programme on Social

Inclusion of the ESF 2014–2020, involve SDL in supporting the Municipality of Turin and third sector organisations in reorienting public services for people experiencing homelessness (Campagnaro et al., 2022). The process has followed a participatory approach, enabled by the legal framework of Codesign (Campagnaro & Di Prima, 2022). Initially, it focused on problem-framing and strategy definition, informing policymakers' introduction of a new intervention within Turin's Social Inclusion Plan. The current phase involves experimentation, monitoring, and evaluation of new service models, with the potential to institutionalise these innovations within the city's social inclusion policies (Di Prima et al., 2025; Campagnaro et al., 2022).

Alimenta

Alimenta is a design-led systemic initiative addressing food poverty among people experiencing homelessness in Turin. Supported by a private actor and a collaboration with three social cooperatives managing six public shelters, the project operates on three levels: food access, capability-building through food-related activities, and academic research on innovative solutions to combat food poverty (Campagnaro et al., 2023; Passaro et al., 2021). Over time, the initiative has expanded into a broader network, fostering a local food system that creatively supplements institutional responses to food poverty. From a design-for-policy perspective, the research group and other stakeholders see Alimenta as a potential reference point for engaging with the City on food policy, showcasing a systemic, multi-stakeholder, and multidimensional approach (Campagnaro et al., 2023; Curtabbi & Campagnaro, 2023).

Design Research Lab

The Design Research Lab (DRLab) was an experimental research initiative at the University of Trento's Department of Humanities, integrating complexity theory, semiotics, and design methodologies—specifically, Service Design Thinking and Design Research. Co-funded by the Provincia Autonoma di Trento, it functioned as a local policy lab to introduce and promote service design culture in strategic sectors, including education, private industry, and public policy. During its first three years, DRLab developed and tested a framework for transferring design knowledge to policymakers and public civil servants (Busciantella-Ricci et al., 2019; Busciantella-Ricci and Ventin, 2020a; Busciantella-Ricci and Ventin, 2020b). This process also fostered recognition of service design as a strategic tool for local policy development (Provincia Autonoma di Trento, 2019; Busciantella-Ricci et al., 2022).

The Healthy Neighbourhoods Hub project

It is a two-year action-research project introducing the Healthy Neighbourhoods Hub (HNH) framework to address urban health within the built environment (Busciantella-Ricci et al., 2024; Macchi et al., 2024; Rinaldi et al., 2025). Focused on two areas in Florence—spanning three neighbourhoods and five districts—the project involved partnerships with local public policy bodies such as the Municipality of Florence and the

Local Health Authority. The research engaged key stakeholders, including local communities, third sector entities, and policymakers, to co-create the HNH framework and develop strategies for building healthy and inclusive neighbourhoods by integrating local knowledge with best practices and literature reviews. The project resulted in a set of strategies, design scenarios, and guidelines to implement the HNH framework (Setola & Rinaldi, 2024), which were incorporated into observations on the Municipal Operational Plan and Structural Plan of Florence.

The Riace model in the DesIA project

The Riace model is a case study in a research project that explored the Design for Inclusive Attitudes (DxIA) (Busciantella-Ricci, 2023; Busciantella-Ricci et al., 2024). Design ethnography methods, including direct observation, contextual interviews, and spontaneous focus groups, were conducted in the villages of Riace and Camini in southern Italy. These villages are known for their immigrant hospitality models (Driel & Verkuyten, 2020; Ranci, 2020; Carbone, 2023), developed by local communities without formal design training. The researchers interacted with the founders, former policymakers and local communities to explore how these models shaped attitudes toward immigrants and how they could inform the DesIA project (DesIA, n.d.) from a design for policy perspective.

The LoveGiver project

The LoverGiver project was also explored as a case study within the same research project mentioned earlier, which focuses on service examples promoting inclusive attitudes towards diversity and inclusion (Busciantella-Ricci, 2023). The project aims to raise awareness about the relationship between sex and disability, serving as an experimental service that promotes the sexual independence of disabled individuals (Morales et al., 2020). It became a key reference in regional policy discussions in Tuscany (Popolla & Scudieri, 2023; Mozione 1228 [Motion 1228], 2023), leading regional policymakers to propose a law to the Italian Parliament (Proposta di legge al Parlamento n. 15 del 21 dicembre, 2023 [Bill submitted to Parliament No. 15 of 21 December 2023]) to introduce the role of operators and educational programmes on emotionality, affectivity, and sexuality.

Table 1. Selection of the cases and their relevance

Case name	Relationship with the policy level	Achieved impact on the policy level
Alimenta 2014-ongoing (case 1)	Long-term institutionalisation of a bottom-up process - aiming at institutionalising the bottom-up process to inform local food policies, expanding the system to the entire city scale	Dialogue with the Municipality, raising awareness on the existence of this process (and its outcomes)
Design Research Lab 2017-ongoing (case 2)	Specially funded by a local government to test the application of service design in strategic sectors and to improve their policies	Widespread introduction of service design in the construction of new policies in some strategic sectors

Reorienting public services for people experiencing homelessness in Turin 2018-ongoing (case 3)	Planned indirect influence on policies - collaborating with policymakers for system analysis and problem-framing - setting new objectives and interventions for the current service system, incorporating them and their principles in the city's social inclusion policies	Recognition of the process and its outcomes by the political side of the Municipality, taking them as a reference for future policy formulation
The Healthy Neighbourhoods Hub project 2022-2024 (case 4)	Local government as a project partner: - Influence policies by involving policymakers and relevant influential actors in action-research processes and co-design events	The main results have been included in a series of observations on the POC (Municipal Operational Plan) and the PS (Structural Plan) of the local municipality (Florence, Italy)
LoveGiver project 2023-2024 (DesIA project time-frame) (case 5)	Guiding the discussion and providing information on the debated topic about the relationship between disability and sex	A regional law approved the role of the figure of the "operator for emotionality, affectivity, corporeality and sexuality for people with disabilities"
Riace's model 2023-2024 (DesIA project time-frame) (case 6)	Piloting the complexity of the refugees' hospitality in accordance with the local needs	The local experience has been recognised as an effective experience at the national level

2.2 The first framework formulation

In the second stage, we adopted an inductive reasoning approach (Trochim, 2005) to identify patterns from our cases, specifically focusing on how they suggest an entry point into the design-for-policy arena. We developed a first hypothesis of the framework (results in Figure 2) by collaboratively noting the factors in each case that could position it as a potential starting point for 'making' design-for-policy. The theoretical construct used for this analysis aligned with two key elements from the academic frameworks mentioned in the introduction: the definition of the actors bringing design capability and the relationship between design contributions and knowledge production to inform the policy process. In the first round, a general code was assigned to each case, followed by a second round where we identified predominant factors that could serve as recurring entry points for design for policy.

2.3. Validation of the framework

To substantiate the initial version of the framework, additional cases drawn from our studies were selected using a typical-case approach (Gerring, 2006), being guided by the three entry points. These cases were identified through: (i) Horizon Europe and Horizon 2020-funded projects, accessed via the Cordis search engine with keywords such as

'design for policy,' 'policy design,' and 'design thinking'; (ii) policy labs, public policy innovation labs, and governmental innovation labs; (iii) impactful literature and repositories that showcase selected examples of design for social innovation (including Manzini, 2015; Amatullo et al., 2021; Manzini & D'Alena, 2024) and community-led social innovation cases (European Commission, 2020; European Social Fund Plus, n.d., filtering for 'Delivering+public+policies' and selecting related initiatives), which particularly focus on the innovation of social policies (Junginger, 2013; Amatullo et al., 2021).
The following paragraph presents the selection of examples we used to discuss and validate the initial version of the framework.

The Interreg Europe project RETRACE (Barbero, 2017) (EX1) exemplifies entry point 1 by promoting systemic design as a method for local and regional policies toward a circular economy. Systemic design experts provided stakeholders with essential knowledge to enhance policymaking and support the transition to a circular economy (Giraldo Nohra et al., 2020). A key output was the creation of a "Systemic design method guide for policymaking," which aimed to equip policymakers with the tools and guidelines to define sustainable interventions (Barbero, 2017).

La 27e Région's project La Transfo (EX2) is an experimental program designed to help public administration departments develop innovation labs. Its goal was to foster a new approach to policymaking that enhances effectiveness and sense-making (La 27e Région, 2015). The program focused on capability-building for civil servants and elected officials, training them in innovation-oriented competencies, including design methods. Designers collaborated with social scientists and city planners to support this process (Amatullo et al., 2021). This example supports entry points 1 and partially 2, representing a pioneering effort to create spaces for experimenting with design for policy and gradually integrating it into the public sector.

As another example of entry point 1, Public Sector Innovation (PSI) labs (EX3) serve as spaces for "applying design approaches to policy-making" (Whicher, 2021, p. 253), integrating design into public administration alongside other disciplines. These labs transfer design capabilities, such as creativity, abduction, and human-centeredness (Villa Alvarez et al., 2022; Lewis et al., 2020), while also promoting multi-actor collaboration (entry point 2). This approach enhances policy outcomes by fostering a more citizen-aware perception of public issues and enabling more effective solution development and implementation (Fuller & Lochard, 2016; Lewis et al., 2020; McGann et al., 2018; Tõnurist et al., 2017).

Similarly (entry point 1), the SEED project (EX4) aims to establish Social Innovation Competence Centers, where multi-actor teams (e.g., researchers, practitioners, policymakers, and civil servants) collaborate to develop public infrastructures that help national authorities better utilise European Social Funds to mainstream Social Innovation as a Public Sector Innovation approach (SEED, n.d.a). The project emphasises capacity-building, with design playing a crucial role in directly influencing policies. The toolbox provided, based on the double diamond design thinking approach, highlights the

project's commitment to using contemporary design as a central element in the development of the Competence Centers (SEED, n.d.b; SEED, 2023).

The SISCODE project (entry point 2) (EX5), funded through Horizon 2020, aimed at "stimulating the use of co-creation methodologies in policy design" by applying bottom-design-driven approaches to influence Responsible Research and Innovation, and Science, Technology, and Innovation Policies (SISCODE, n.d.). This project highlights three key factors (c.f. Deserti et al., 2020; Deserti et al., 2022): (i) co-creation as a central activity for impacting policies, (ii) co-creation labs as spaces for aligning multiple actors' needs in policymaking, and (iii) a design-driven approach to foster bottom-up policy initiatives. Additionally, the creation of the SISCODE Toolbox illustrates the project's commitment to facilitating collaboration in the design-for-policy process.

The Global GovJam (Global Gov Jam, n.d.) (EX6) is a notable example of a co-creation initiative that supports policy design processes (entry point 2). It operates in three key directions: (i) networking individuals, including non-designers, interested in designing policies or services for the public interest, (ii) promoting contemporary service design culture, and (iii) co-designing or simulating the co-design of services and policies, thereby opening new opportunities for local policy development. This event exemplifies how citizen-driven collaborative processes, often led by design, can contribute to proposing new public services and policies.

Community-driven initiatives can also provide valuable insights for policy-making, even if they are not design-led (entry point 3). These social innovation projects, developed by citizens or specific communities, have had a significant impact on policies and are often recognised as inspirational practices in Europe (European Commission, 2020). Examples include:

- The Malopolska Incubator for Social Innovation (EX7), which focused on disability challenges and facilitated the co-creation of innovative products and services. Some of these innovations were upscaled nationwide through support from the Polish Ministry of Investment and Economic Development, demonstrating both community-driven and policy-collaborative impacts (entry points 3 and 2).
- Intercultural Assistants in Czechia (EX8), which aimed to improve migrants' access to public services by introducing a new role in social services. This initiative increased tolerance and intercultural competence among service officers, exemplifying how community-driven efforts can lead to policy innovation (entry point 3).

Finally, the Buurtzorg model (EX9) was developed to address neighbourhood nursing care needs, offering a system tailored to the specific needs of citizens within their local context (Buurtzorg, n.d.). This model has been implemented in various countries, including the US and UK (Gray et al., 2015; Lalani et al., 2019), and is gaining attention from policy levels bridging health and social care sectors (Department for Health and Social Care, 2022;

Rajan et al., 2024; Khan, 2023). Though some authors recognise elements of design thinking in the model (Monsen & De Blok, 2013), it was originally founded by a nurse with different intentions, aligning more closely with entry point 3.

3. Results

From the initial analysis of the selected cases (paragraph 2.1), we identified three relevant patterns that describe the following three entry points in design for policy:

- Entry point 1: Transferring design knowledge to non-designers for policy-making processes;
- Entry point 2: Fostering knowledge co-creation among the actors involved in policy design;
- Entry point 3: Recognising existing policy design processes led by non-designers through a design perspective.

These three elements (highlighted in Figure 2) frame the initial version of the framework, which was refined with the introduction of the examples presented as cases in paragraph 2.3.

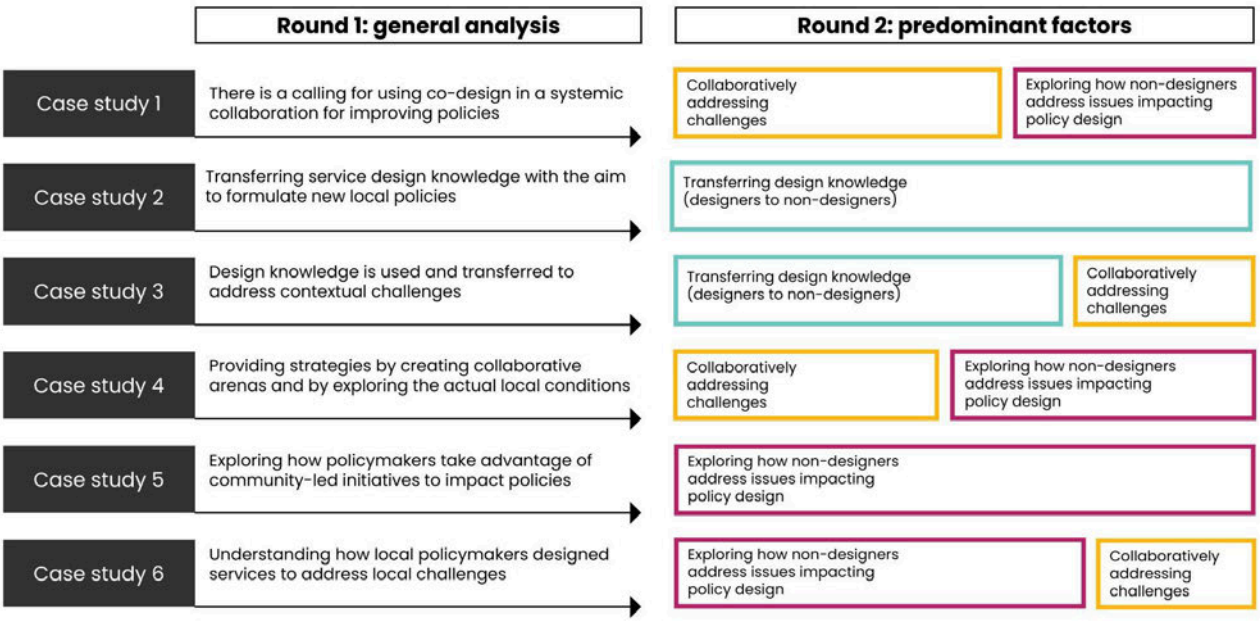

Fig. 2. Entry points identified in the case analysis: The initial version of the framework.

According to the validation process described in paragraph 2.3, the three entry points were refined based on the cases analysed in Figure 2. Specifically, Figure 3 provides a synthesis of 15 cases used to generate and describe the framework. Initially, these cases were identified as cases 1 to 6 (drawn from our direct experience). Later, they were expanded with additional examples that helped refine the patterns and enhance the details for describing the three potential entry points, which are the focus of this contribution.

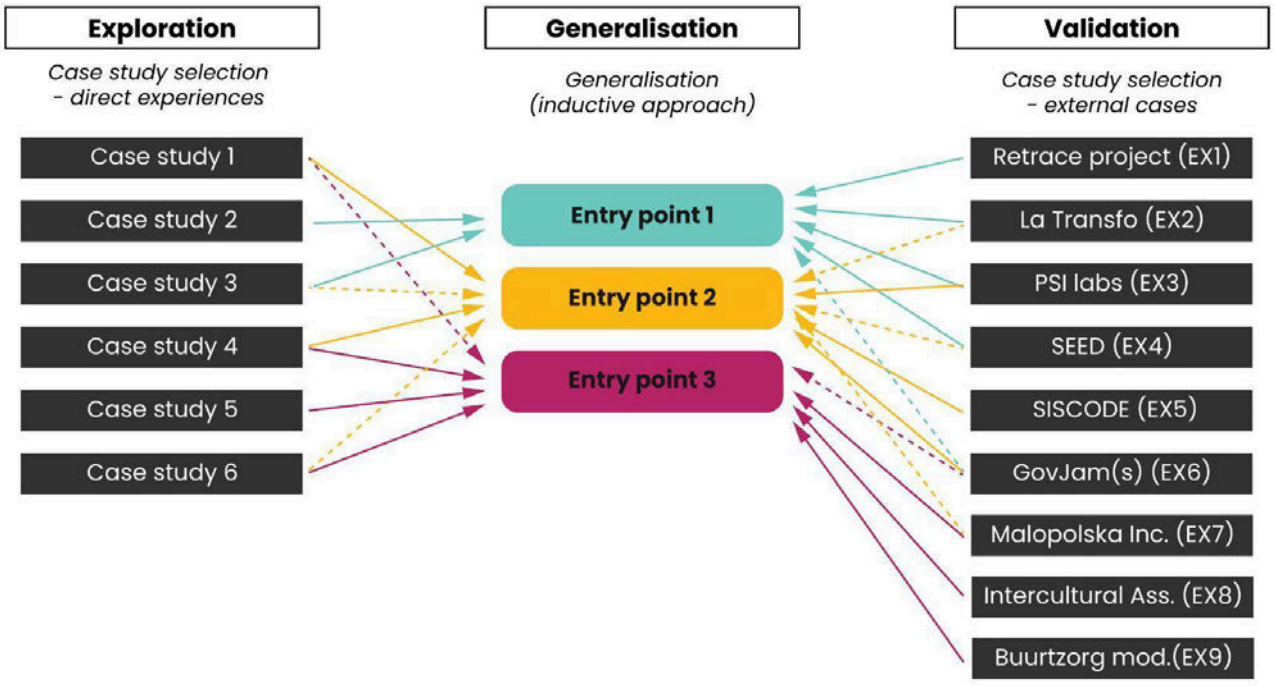

Fig. 3 The distribution of the cases according to the three entry points.

The three entry points correspond to the 'axes' on which design and designers can act to impact policies. In this sense, these entry points can be seen as 'strategies' for triggering design-for-policy initiatives.

Entry point 1 focuses on transferring design culture and expertise to policymakers and public sector actors, enabling them to independently adopt a design-led approach to policy-making. It involves initiatives that build design capabilities to introduce contemporary design thinking in the policy-making process. The study highlights cases 2 and 3, along with examples 1, 2, 3, 4 and 5, as key representations of this entry point.

Entry point 2 is related to co-creation within policy processes, epistemologically grounded in co-design, and exemplified by models such as Research Through Co-Design (Busciantella-Ricci & Scataglini, 2024). Co-design can serve as an entry point for opening a policy arena and addressing a challenge collaboratively, defined as the application of collective creativity from both designers and non-designers at any stage of the design process (Sanders & Stappers, 2008). According to the study presented in this paper, cases 1 and, partially, 3, 4, and 6, as well as examples 3, 5, 6, and partially, 2 and 4, are the most appropriate to represent this entry point.

Entry point 3 focuses on the transformation of a context by non-expert designers, including active citizens and policymakers who engage in designing for policy without formal design expertise. This entry point is characterised by initiatives driven by policymakers aiming to creatively address local problems or challenges, often under constraints of time and resources. While these projects might lack explicit design training, they contribute valuable insights to the design-for-policy field, particularly when explored by design researchers.

Also, many of the initiatives in this entry point fall under community-led projects, which can open new design-for-policy arenas and are frequently found in the field of social innovation. The study highlighted that 4, 5, 6 and partially case 1, as well as examples 7, 8, 9, and partially example 6, are the most appropriate to represent this entry point.

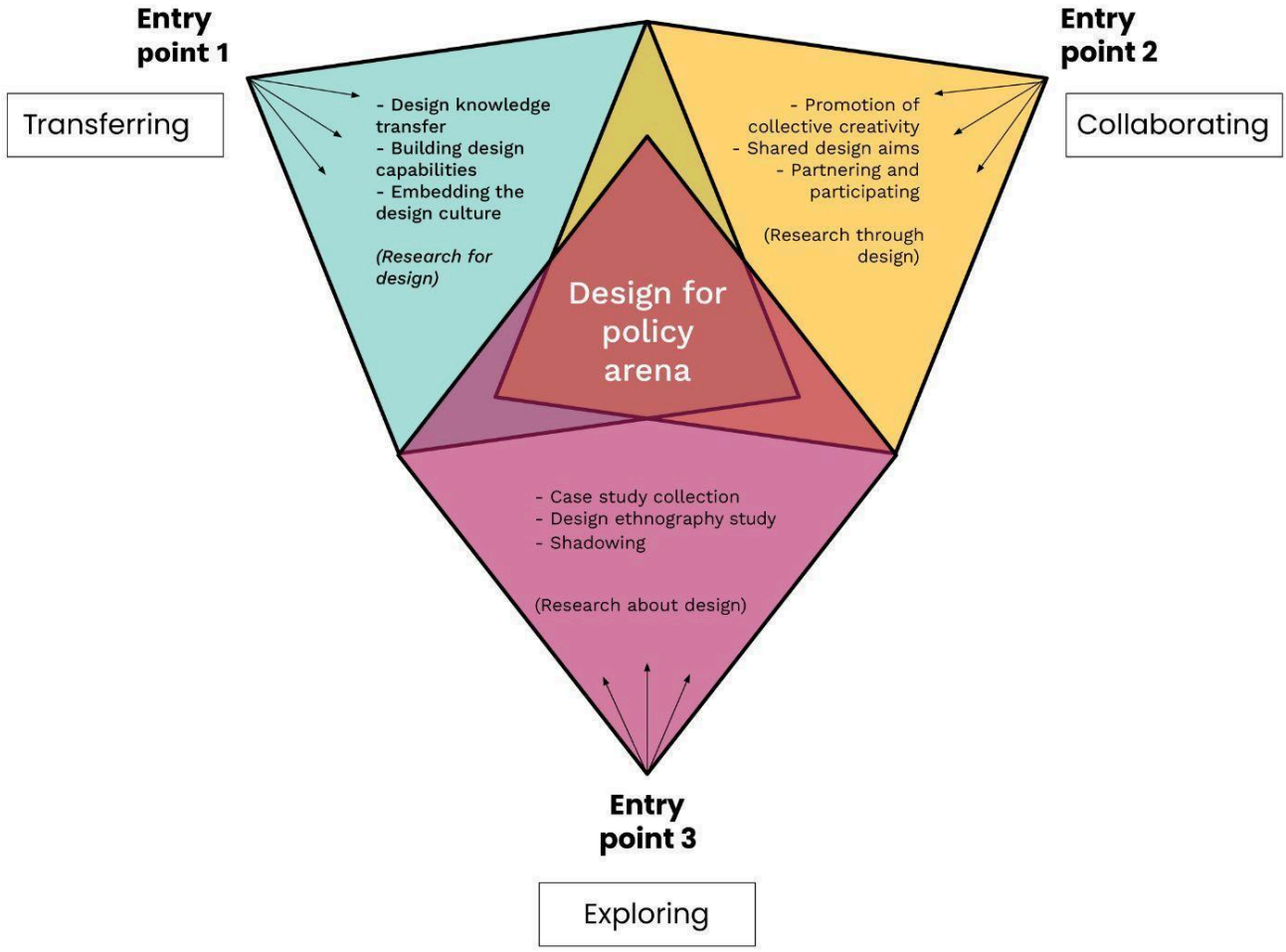

Fig. 4. The three entry points in design for policy.

Analysing the cases clarified the potential functions associated with each entry point for those seeking to access policy arenas. As explored in Figure 3, it is possible to propose several activities that enable the concretisation and implementation of these entry points:

- Entry point 1 involves initiatives that focus on transferring design knowledge to specific policy areas, building design capabilities, and embedding design culture within relevant contexts, aiming to develop a design-for-policy process. From a design research perspective, this entry point can align with "research for design" (Jonas, 2015; Glanville, 2005; Frayling, 1993), emphasising the need to understand what design knowledge is most useful to facilitate entry into the design arena.
- Entry point 2 focuses on initiatives that promote collective creativity, particularly through co-design, and foster discussions around shared challenges with local partners. Key actions in this entry point include engaging local authorities in co-design activities to address common challenges or strategic topics. From a design research perspective, this

entry point is closely aligned with "research through design" (Jonas, 2015) and, more specifically, "research through co-design" (Busciantella-Ricci & Scataglini, 2024) using co-design as the epistemological medium to address the design-for-policy arena.

- Entry point 3 focuses on initiatives that involve case study collection, particularly those exploring projects led by policymakers, civil servants, or third sector entities, as well as design ethnography studies that examine strategic areas for design in policy. It emphasises exploring the contexts in which policies are developed daily. From a design research perspective, this entry point aligns with "research about design" (Jonas, 2015; Frayling, 1993), which involves observing and studying how policy design processes are carried out by policymakers and other stakeholders. The primary interest here is in uncovering new knowledge that enriches the design field, thereby facilitating access to the other entry points and contributing to the broader understanding of design-for-policy processes.

Table 2. Key aspects of the three entry points.

Entry points	Key actors and roles	Priority context	Typologies of interventions	Barriers	Enablers
Entry point 1	- Design researchers/ professionals (senders) - Civil servants and policymakers (receivers)	- Vocational education and training programmes	- Transferring design knowledge - Building design capabilities	- Beneficiaries' mood and backgrounds (e.g. cultural and organisational resistance to change)	- clarifying design contributions, show potential (with success stories and 'proof by example' approach) - starting from policy challenges characterised by low scale and complexity
Entry point 2	- Design researchers/ professionals (partners) - Civil servants and policymakers (partners) - Local third sector entities (partners)	-Multi-stakeholder local development projects	- Solving local problems or addressing local challenges through co-design	-Low/seesawing level of participation of local actors/capability of involving them - Timing and stalemates of institutional processes - Limited transformative power of the process/actors	- Identifying (institutional) frameworks and contexts fostering collaboration - Making the value of design emerge from the process itself / Promoting design contribution in terms of benefits for the process and outcomes,

					rather than in terms of new competences and approaches - Building mutual trust between actors and spaces for reflexivity
Entry point 3	- Design researchers/professionals (observers) - Civil servants and policymakers (observed) - Local third sector entities (observed)	- Policy design and development by non-designers	- Observing and collecting data on how policies are designed by non-designers	- Time and resources for the observation - Possibility to join the process in order to observe it - 'Designerly' value not evident from the outset/delay in identifying the right process to observe	- Being attentive towards social innovation processes at a local scale

4. Discussion and conclusions

As discussed so far, the three entry points can serve as potential gateways to be introduced into the design-for-policy arena. Conceptually, they act as pre-conditional factors or inputs—'triggers'—that help democratise access to the design process within policy-making.

However, it is important to note that a few conditions must be considered when using the framework as a reference. First, acknowledging the ongoing struggle in design research to clearly define who qualifies as a "policy designer" (Whicher & Swiatek, 2022; Vaz & Bosch Gomez, 2022), the selected cases for validation highlighted the challenges in distinguishing roles and boundaries within each example. This partially supports the emerging discussion in the fields of design for policy and design for social innovation (e.g., Kimbell et al., 2023; Amatullo et al., 2021), which suggests that differentiating individual roles may not be necessary, convincing, or even beneficial in such arenas. However, if these differences continue to be emphasised in the literature, this could impact entry points 1 and 3.

Second, keywords such as participation, co-design, and co-creation are becoming increasingly popular in the design for policy field to describe how to address the challenge of creating policies through creative, collaborative, and more democratic processes (e.g., Blomkamp, 2018; Mintrom et al., 2024; Matti et al., 2022). However, it is important to emphasise that the full integration of co-design into the design for policy field can face

challenges (e.g., Mintrom et al., 2024) and may lead to confusion, as seen in the diverse values, meanings, and types of activities associated with the selected cases. Therefore, entry point 2 suggests that design-led collaborations require structured and thorough preparation before entering the design-for-policy arena (cf. Matti et al., 2022).
Third, the examples related to entry point 3 highlight that it can function as a precursor to the other two entry points. We still encountered challenges in explicitly identifying cases or examples where design researchers gather insightful data on how civil servants and policymakers - who are not necessarily influenced by contemporary design culture or buzzwords - design policies in complex social situations. This could be a strategic way to enter policy arenas and contribute to enhancing contemporary knowledge of design for policy.
This also opens the discussion on the entry points as a series of strategies for introducing entities engaged in design or design research into the design-for-policy arena. As mentioned in the introduction of this paper, existing literature has suggested frameworks for strategic actions to enable design thinking in the public sector (Brinkman et al., 2023). However, the framework by Brinkman et al. (2023) focuses on a taxonomy of strategies that assumes design thinking is already established within the entities it targets. Consequently, similar to this framework, 'Enhancing compatibility' and 'Building confidence' correspond to entry point 1 of the framework presented in this paper, while 'Forming an alliance' and 'Generating support' align with entry point 2. However, entry point 3 is not explicitly represented, and entry point 2 is not clearly emphasised as a strategy in the framework. Entry point 3 underscores the importance of design in navigating approaches such as those recognised as 'community-led'—including the radical ones (e.g., see Udoewa, 2022)—and cautions against adopting a design-ego approach when understanding design for policy, as this may risk trivialising the role of design.

With regard to existing frameworks on design for policy (e.g., Brinkman et al., 2023; Hermus et al., 2020; Kimbell et al., 2023; Van Buuren et al., 2020), our set of entry points shares a common focus on identifying who carries design expertise within policy-making processes. Additionally, it reorders some key elements found in those analyses. First, entry point 1 highlights a design for policy approach aimed at innovating policy-making on a broad scale—by training policy professionals and equipping them with new skills and knowledge. Second, entry point 2 aligns with literature emphasising the participatory nature of the policy process, with a focus on fostering a more inclusive and democratic generation of solutions and interventions. Finally, the inclusion of entry point 3 allows us to address the diverse perspectives found in the literature, which examine whether design contributions come from expert designers or from non-designers involved in the process. Regarding the differences and distances from existing frameworks, it is important to note that the entry points presented here do not focus on well-established contexts of design for policy but on the ways to create these kinds of spaces. Our proposal is not intended to substitute or advance existing frameworks; rather, its goal is to encourage reflection on how design researchers can enter these frameworks. In this sense, it identifies possible access channels or 'triggers' through which design can be engaged and solicited to contribute within policy processes. For example, the framework can serve as a reference

for designers and, particularly, for academic entities engaged in design research, helping them understand how to structure research projects aimed at influencing design for policy. Embedding these entry points within the work packages of design research projects may increase the likelihood that those organisations establish touchpoints and find opportunities to enter the design-for-policy arena.

Entry point 1 encourages collaboration between designers and public administration bodies, focusing on the need to develop innovation-oriented capabilities and understanding how these efforts, even indirectly, relate to policy-making. Entry point 2, on the other hand, invites designers to explore opportunities for co-designing with public and private stakeholders to address shared public issues, while critically examining the impact of this collaborative action on policy outcomes and the governance of the process. Finally, entry point 3 may inspire designers to explore other fields looking for approaches that display a 'designerly' sensibility and could inform policy design actions, learning from non-designers on how to approach design for policy.
From a more analytical perspective, these entry points can serve as lenses for designers to identify and uncover cases not yet recognised in the design for policy discourse. By examining these cases through the proposed entry points, designers may gain new insights into the impact of policies, while also opening up fresh research avenues and reflections.

According to the research question, entry points 1 and 2 help identify existing experiences of design for policy that have not yet been labelled as such, while entry point 3 creates a space to proactively approach this emerging design field of where it is underexplored. The three entry points should be seen as potential entryways into the design-for-policy arena, and more than one entry point— or even all three— can be used simultaneously to establish the necessary conditions for projects that enable a promotional entity to enter the design-for-policy sphere.
In contexts where design for policy is primarily dominated by a few powerful entities, this framework can serve as a tool— potentially even a political one— to raise awareness about how certain design and research skills can be instrumental in breaking down seemingly closed barriers.
An expected impact of this framework is that it could encourage a reflexive approach, prompting a re-evaluation of past and future design research projects through the lens of the three entry points. This shift in perspective may influence how projects are designed, both for design research and practice and for policy purposes, potentially transforming the way design engages with policy processes moving forward.

4.1 Limitations and perspectives for future research

This study, however, has limitations that also point to avenues for further research. First, the cases and examples presented here need to be examined through more exploratory research, ideally involving design-for-policy experts, policymakers, and civil servants, complementing and balancing the current approach with a more field-based research perspective. Second, the framework should be developed in collaboration with other academic institutions and social innovation entities to facilitate an iterative validation

process of the three entry points, and potentially introduce new ones. Third, a more deductive approach should be adopted in future research to strengthen the identified patterns. These aspects are still in an early stage, primarily because field-based research has not yet been developed due to a lack of time and funding to support such projects. Moreover, initiating these activities requires a solid theoretical foundation, one that needs further discussion and refinement. Feedback gathered in contexts such as this conference can play a valuable role in helping to strengthen the theoretical framework and optimise the planning of future research activities.

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ENTRY POINTS FOR DESIGN FOR POLICY: EXPLORING A FRAMEWORK WITH THE THEORY OF CHANGE

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ABSTRACT | Design for policy is an emerging field that, in some contexts, still fights for being acknowledged (Kimbell et al., 2023; Mortati, 2019). In this scenario, we propose a framework of three "entry points" for design for policy: (i) transferring design knowledge to non-designers, (ii) fostering co-creation among policy actors, and (iii) recognizing non-designer-led policy processes. In parallel, the Theory of Change (TOC) (Anderson, 2005) has gained attention as a tool in design for policy (Cole, 2022; Compton et al., 2019; La 27e Région, 2024).
We propose a 90-minute activity to align the TOC with the authors' framework to explore how TOC can help pursue the conditions suggested by the three entry points to design for policy. Participants will be divided into groups, role-playing the following actors: (i) designers, (ii) policymakers, and (iii) policy takers and other stakeholders. The three groups will be guided to use the TOC collaboratively within a given policy scenario. They will engage in co-constructing a TOC, facilitated by a 3D version of the instrument, built following the LEGO® Serious Play® method.

KEYWORDS | DESIGN FOR POLICY, THEORY OF CHANGE, DESIGN KNOWLEDGE TRANSFER, RESEARCH THROUGH CO-DESIGN, NON-EXPERT DESIGN

X-format proposal

Design for policy is an emerging field for Design research and practice identifying the space where design approaches and methods innovate policy-making towards a more open, democratic and experimental process (Bason, 2014; Kimbell et al., 2023; La 27e Région, 2015). Although practices pertaining to this field have expanded in many - especially Western - countries, in some contexts they still remain niche, if not 'invisible', hardly or never acknowledged. This is the case, for instance, of the Italian scenario, where, apart from a few academic entities (Deserti et al., 2020; Giraldo Norha et al., 2020; Mortati et al., 2016; Mortati et al., 2019), this field seems to be uncharted. We have then proposed three possible 'entry points' to approach this area, as viable ways to start 'doing' design for policy where this is neither acknowledged nor consolidated: (i) the transfer of design knowledge and expertise to non-designers within policy processes, (ii) the co-creation of knowledge among policy actors, and (iii) the recognition of non-designer-led policy processes. In our vision, these entry points represent conditions to be created in order to make design for policy possible and accessible. Therefore, we expect such conditions should be envisioned through a transformative design process. Hence the idea of connecting this perspective to the Theory of Change (TOC), a tool to design change that has recently gained a growing interest from researchers and practitioners in the field of public innovation and policy (Cole, 2022; Compton et al., 2019), even being questioned to sustain complex challenges (La 27e Région, 2024).

The hypothesis we would like to verify through this X-format is that TOC can be a meta-design tool to help designers - as well as non-expert designers - conceive the enabling conditions highlighted by the three "entry points", define the transformative trajectories - traced through impact, outcomes, outputs, activities and inputs - that might generate the expected change for making design for policy possible. In this sense, each entry point should correspond to a different TOC that we need to build together with the research community engaged or intrigued by the topic.

On a practical and methodological level, we propose a workshop session of 90 minutes where participants are divided into three groups, according to the three "entry points" as changes to achieve. Within each group, participants are involved in a role-playing activity to relate with a different core actor in policy-making: (i) designers, (ii) policy makers, and (iii) policy takers. They are guided by facilitators and supported by written instructions to help interpret their roles, with the aim of collaboratively developing a Theory of Change (TOC) using the LEGO® Serious Play® method (n.d.). This approach enables them to "build" their vision of change in relation to a fictitious policy scenario that provides context for the assigned "entry point". Participants are exposed to questions around the different points of view and interests of each category of stakeholders, the conditions enabling design for policy processes, and their precariousness. The three resulting TOCs are collectively discussed, reflecting on their similarities and differences, as well as on the challenges, dark points, needs and hopes they disclose.

The ultimate goals and takeaways of this session concern (i) unveiling interrogations, barriers and triggers around the possibility to start practising design for policy, (ii) enabling participants to picture themselves as potential "policy designers" (Whicher, & Swiatek, 2022; Vaz & Bosch Gomez, 2022), and (iii) endowing them - and us authors - with actionable paths to achieve this possibility.

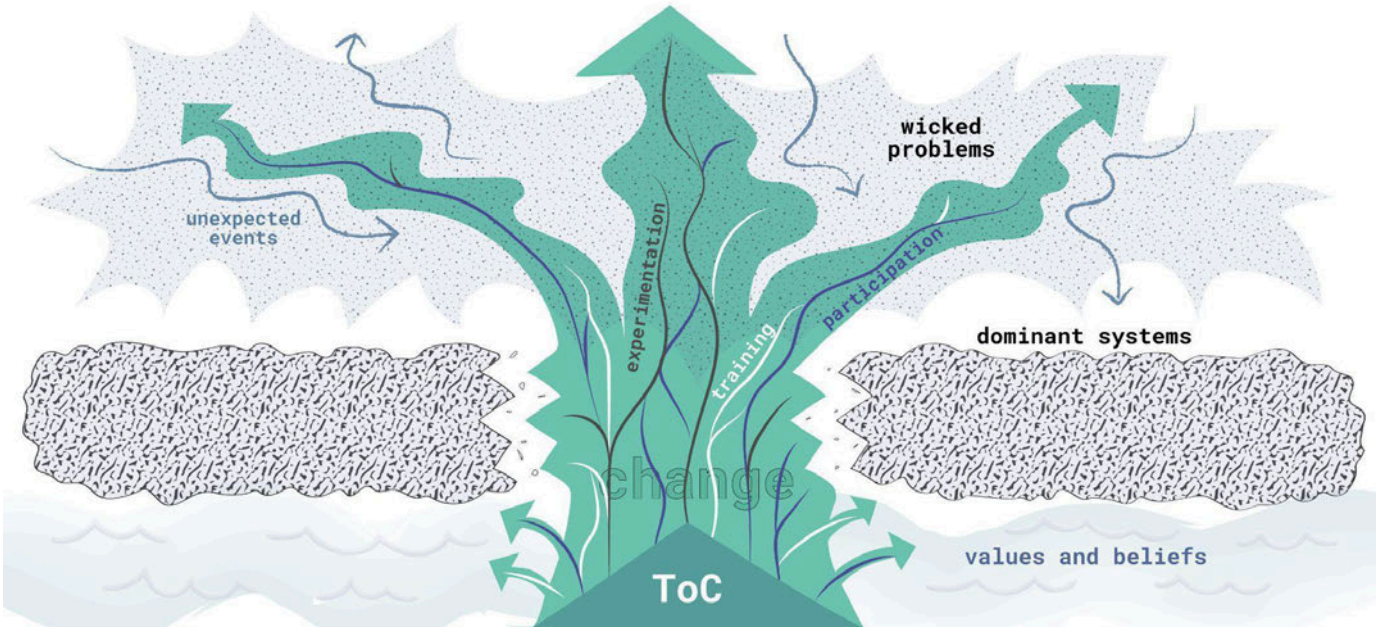

Figure 1. Strengthening TOC to challenge status quo and pursue complex public innovations; Illustration by one of the authors of the X-format proposal, created for a programme called "Pushing the Boundaries of Public Sector Innovation" (2023).

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FROM INTERVIEWS TO PLAYFULNESS - a child & youth-centred design approach to policy-making

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ABSTRACT | There has been a tradition of professionals creating the child- and youth-policies in municipalities in Denmark, containing the risk of not including the direct perspective of children and young people. There are a tendency of involvement of children and young people being through e.g. teachers or by involving primarily high-performing participants through e.g. youth councils which presents a risk of diverse and relevant perspectives being excluded.

In a collaboration between Kolding School of Design and the municipality of Ringsted, it has been possible to study how children and young people can be included on a more equal basis, by implementing more relevant and playful methods for user involvement. Approximately 7000 of the municipality's children and young people, between 3 and 25 years old participated in the study.

Methods adjusted to the context and participants, have shown potential to highlight perspectives that might not have been found by the typical approaches.

The study points to the potentials of using playful methods and the combination of different approaches, to gain insights for policy-making. It also indicates the benefits of collaboration between design and policy, for a more democratic approach to policy-making.

KEYWORDS | CHILD- & YOUTH-CENTRED DESIGN, PLAYFUL METHODS, POLICY-MAKING, PROCESS FACILITATION, DEMOCRATIC PROCESSES

1. Introduction

Sometimes, we do things simply because that is how we have always done them, and because everyone else does it that way. This might well be the case with the development of child and youth policies in Denmark. The traditional process involves politicians and administrative staff in municipalities formulating the values underpinning the municipality's work with children and youth, as well as outlining the vision for the next 5 to 10 years. Over the past 5–10 years, many municipalities have expanded this approach by involving municipal practitioners, such as managers, teachers, and social workers, to gather their input on the policies and ensure their relevance for the staff. This is in line with Buchanan (2020) arguing that the co-design practice in e.g. the public sector has great potential and relevance, however it is currently underdeveloped and not without challenges (Buchanan, 2020). Bason (2014) states that there has been an increase during the last decade, focusing on the values of implementing design approaches in policy-making. This is supported by Binder et al (2015) pointing to potentials by a higher participatory and democratic involvement in policy-making. It also lies within the sustainable development goal to `leave noone behind´, emphasising the importance of involving all children and young people across needs and prerequisites, which is a value in the Universal Design approach (Mace, 1997). Generally, for children and young people, there has been a tendency of still gaining insights by-proxy (Drew et al., 2010) or through high-performing children and young people, e.g. by focusing on student councils or volunteers (Li, 2020), possibly due to the sensitive nature of such a target group as well as typical methods not always being appropriate and hence the process of involvement might seem more challenging. Many municipalities have hence chosen to include children and young people through interviews and focus groups within youth councils and similar forums. However, no municipality has aimed for all children and young people in a municipality, to express what is important for them and their specific age group—until now. Ringsted Municipality has reimagined and innovated the approach to developing its child and youth policy, by giving more than 80% of the municipality's children and youth a voice, making their input the primary foundation for the municipality's child and youth policy.

The term "child and youth policy" is defined by Danish municipalities as a description of the overall value base for a municipality's initiatives for children and young people. It aims to create cohesion across the municipality's professional areas and divisions. The policy articulates the municipality's shared values and vision while setting goals and directions for ensuring the quality of services and initiatives for the children and young people residing in the municipality. The intention behind a new child and youth policy in Ringsted Municipality was to base it directly on the voices of children and young people. The goal was to involve as many children and young people aged 0 to 25 as possible, potentially up to 10,000 individuals. The youth school, 'Ung Ringsted', was tasked with facilitating a transparent involvement process and collecting data from the children and young people, to shape the new policy. Based in a child- and youth-centred design approach (Feder, 2020), involvement methods were developed in smaller working groups and further refined by two researchers from Kolding School of Design, specializing in child- and youth-centred design methods. The process began on October 1, 2024, and is expected to conclude in June 2025.

This paper studies the process and share the findings from the involvement of children and young people in the municipality of Ringsted. The study is based on a curiosity on how playful (Christiansen, 2022) and child- and youth-centred design methods (Feder,

2020) can lead to a more honest and nuanced glimpse into the lives of children and young people, becoming the voices and foundation for politicians and decision makers in a municipality.

2. Facilitating playful child- and youth-centred design methods

The data collection focused on different areas, like public institutions such as daycare facilities, schools, and the youth sector, but also including special and private offerings. Different approaches and methods were developed for each age group to reflect the most relevant ways of communicating and expressing their perspectives. Instead of using traditional data collection formats like interviews and surveys, often designed for adults, the project employed child- and youth-centred design methods to capture the voices directly of this demographic—which often tends to be represented by proxies such as parents, teachers, or other professionals (Drew et al., 2010). For the 0–1-year-old children, it was however still deemed necessary to use by proxy, through parents and daycare professionals, but it was an aim with the project, to ensure as direct input as possible. Kids from 8eight public and 6 private schools, 3 special needs schools, 24 public and 2 private daycare centres participated along with the other initiatives as mentioned above.

Different kinds of methods were used in the process. In daycare facilities, the activity "My City" was conducted across all municipal daycare centres over four weeks. The aim was to gather children's input on what matters to them in their city and showcase diverse family structures. After reading the book 'Fanni Builds a Sand City' aloud, children added two pictures to a shared poster. Adults documented their thoughts on notes attached to the poster. Inspired by a theatrical performance about a fictional character's life and family, children also drew their own families and homes to share.

In schools, methods varied across three age groups. In lower primary grades, activities focused on "All About Me," starting with the story about the friendly alien Mio who wants to learn about being a child in Ringsted. This was to support the children imagination and using narratives (Murray, 2008) and a "shared third" to enable the children to reflect more freely about the aspects being asked of them, but also to provide a context (Nitecki & Chung, 2016). A combination of a pamphlet and colouring book was developed focusing on aspects of the children's lives, that the child can fill out with drawings and descriptions dependent on their writing skills and preferences. These were supported with among others, an activity where they created their dream room at home from craft materials and cardboard boxes. Middle-grade students created posters, comics, or schedules for the ideal school day as well as filling out probes developed specifically for the context, called Mind-bags, based on Play Probes (Christiansen, 2022) with inspiration from Cultural Probes (Gaver, et al., 1999) and Design Probes (Mattelmäki, 2006; 2008).

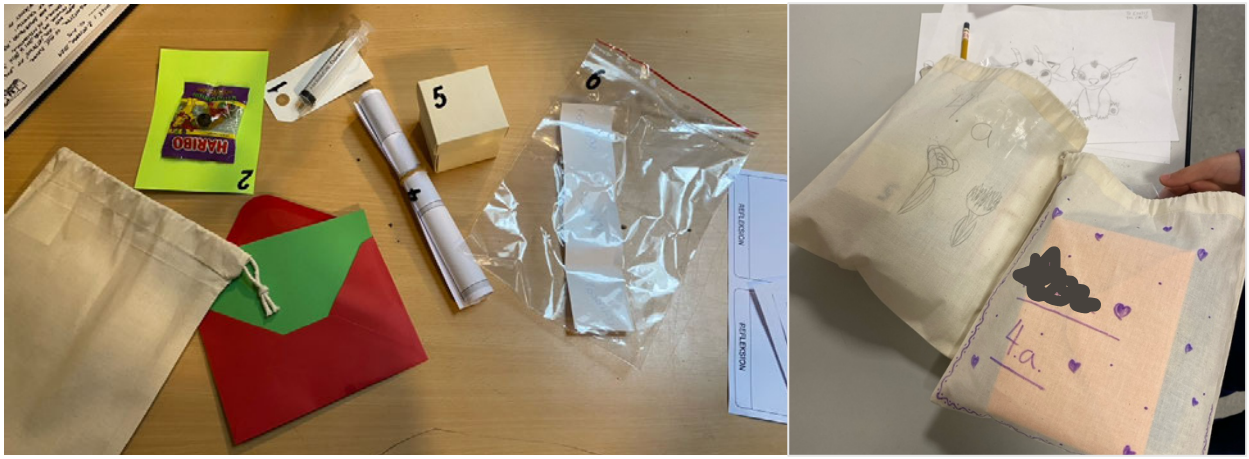

Figure 1: Mind bags and its content on the left. A girl shared her decoration of the exterior of her Mind bag on the right.

Upper-grade students wrote essays, opinion pieces, and collages, incorporating practical/creative subjects and with emphasis on the students taking ownership over the topics they had chosen, finding content and determining how it should be presented. Additionally, some schools used other playful tools such as built structures with play materials and went on a "picture-safari" taking Polaroid photos of meaningful school spaces. Class debates were also held. Student councils from grades 4–9 worked on age-specific tasks during a council day, while members of the joint student council interviewed younger students at their schools.

Surveys were conducted in special education settings with the support of trusted adults. In the specials needs area, the methods varied from place to place dependent on the specific needs, some of the children and young people also filled out the Mind bags and used other playful methods as mentioned above. Others used more traditional methods, such as informal interviews conducted by pedagogues that the child or young person already knew. For the special needs area, it was deemed necessary to completely follow the recommendations from the professionals who knew the children and young people, rather than pushing for using new and playful approaches. Hence an emphasis lied upon onboarding the pedagogues and other professionals working with the children and young people, to a high extend and employing methods involving playfulness or materials when possible.

In the youth sector, workshops were held in secondary education institutions focusing on youth well-being and policy-making as part of civic studies. Young people co-designed peer-to-peer surveys distributed to all within youth education and those aged 18–25 in an online format, from the online survey around 25% of the approximately 3200 young people in Ringsted municipality replied. Follow-up focus groups were conducted at selected institutions. For the students from special education surveys and the other approaches were facilitated by familiar adults, followed by focus group interviews. Additional methods included dilemma games about youth well-being and debates involving RUF – Ringsted Youth Forum and local politicians at a music festival.

3. Analysis of the everyday life

The analysis was done by Ung Ringsted staff, by grouping and thematizing the data, and after building insights, it was then presented to the participants involved, for feedback, confirmation and supplying information. An advisory board and researchers from the Kolding School of Design contributed to this phase. The analysis presented insights on the everyday life for children and young people in Ringsted municipality, including aspects such as school/daycare, free time and general mental health. This showed how the different age groups of children and young people emphasised a focus on different things, such as more time for being creative in school, more flowers and colours in daycare, more room to play for the youngest and specified areas for young

people that they can claim as theirs. More and appropriate support from adults in their everyday lives and easier access to activities was also themes highlighted in different ways. The findings were communicated to children, youth, municipal staff, politicians, and citizens through various formats, including a transparent exhibition space in a container near the city hall, which served as a hub for activities and updates.

Figure 2: The transparent exhibition space close to city hall, before it was taken into use

4. Glimpses into the lives of children and young people

The use of child- and youth-centred design methods emphasizing engaging and playful expression revealed nuanced and profound insights into the lives, interests, and needs of children and young people in Ringsted Municipality. The following section will briefly introduce selected insights that points towards what the children and young people had focused on as important for their everyday life.

Children in kindergarten pointed to a need for a more colourful environment as well as more flowers in the kindergarten. They also focused on a desire for more play-areas, not necessarily specific to playgrounds, but on a more general level. The middle-grade school created dream-schedules that revealed a preference for later school start times and no homework after school hours. The young people's transportation needs highlighted the importance of regular bus service between rural areas and the city centre, reflecting the youths desire for independence and mobility for social, educational, and extracurricular activities. Generally, an emphasis across age groups, were on being a part of their peer-community as well as the physical framing that can facilitate such a community. Interestingly there were a lack of focus on technology, as it did not take up much attention from the participants. Specific examples from selected age-groups are presented below.

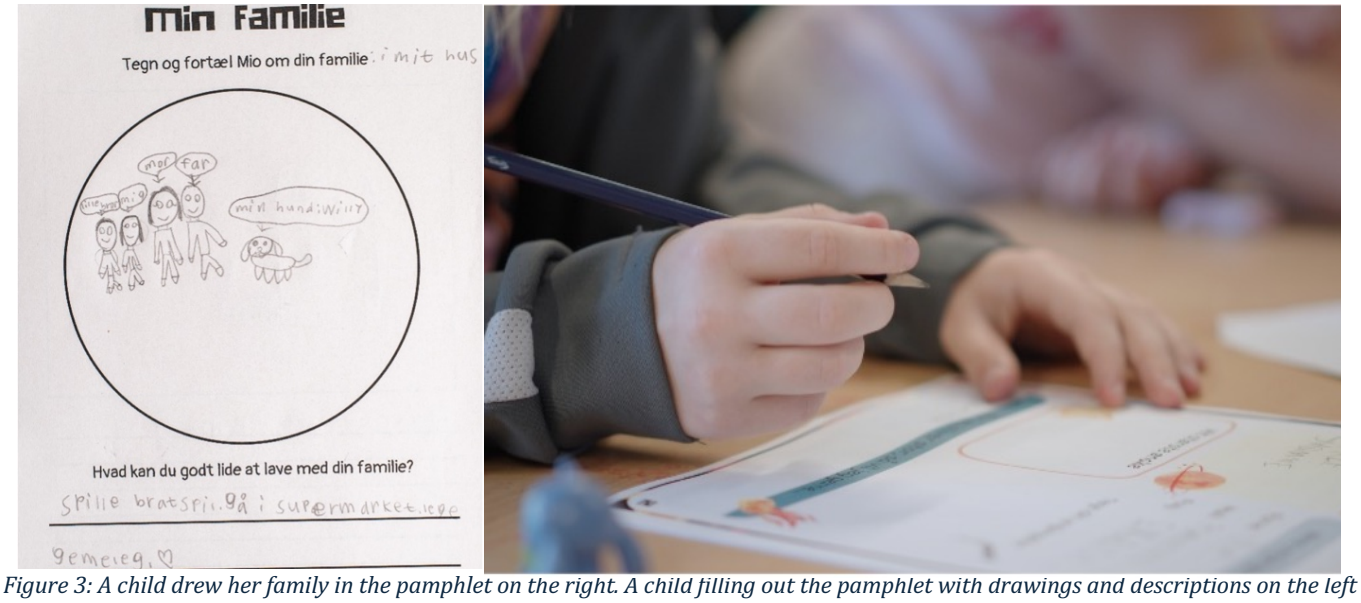

Figure 3: A child drew her family in the pamphlet on the right. A child filling out the pamphlet with drawings and descriptions on the left

In middle school, children aged 10–13 years were given the opportunity to create their own dream-schedules for what they considered an ideal school day. It became clear that a good day for the children starts later than 8 a.m., which is the standard start time in Danish public schools. As an example: “having more time with my mom and dad in the morning, we usually are so busy and do not get to talk together” as stated by a 10-year-old girl. Furthermore, a good school day does not end with homework to be completed after school hours. Most children out of 200 expressed this preference. However, the analysis process struggled to identify the underlying reasons for these preferences, prompting further investigation through follow-up interviews and peer-to-peer activities.

Figure 4: Collection of dream-schedules for a school day

While it may be generally expected in Denmark that school days should or can only start at 8 a.m., the study showed that children desire a different approach. Whether it is feasible to implement this change or explore alternative options to meet the children’s needs and preferences will now be a matter for policy-makers to address. The children also highlighted a wish for more creativity taking presence in school, both through music, art, craft and cooking as well as more time for movement through gymnastics or similar activities.

In secondary school, young people aged 13–17 years created campaigns in groups. Around 100 campaign posters were created with 2-4 participants in each group. The campaign posters pointed towards the following main areas: a need for stronger social bonds through activities, such as camps or trips, with emphasis on the relations peer-to-peer but also youth-to-teacher was important. Another aspect that they highlighted was more support for when young people are not thriving mentally. They also put a focus on the need for a space for young people; a clubhouse, area, room or something that they

can make as “theirs”. It also became evident that young people living outside the city centre strongly desire regular bus services connecting the outskirts to the town centre. Upon deeper analysis of the data, it was clear that this demand was not simply a matter of complaining or entitlement but rather a reflection of the critical role buses play in the everyday lives of children and young people. Buses enable young people to meet friends outside school hours, collaborate on homework, and participate in social activities. Additionally, they allow access to extracurricular activities and sports clubs across the municipality, even on non-school days. Reliable bus service is also essential for maintaining part-time jobs, especially in the evenings or at irregular hours. These are things adults often take for granted because they have access to cars—something children and young people in Denmark typically cannot drive until the age of 18. The bus, in this context, became a symbol or representation of the young people’s broader need for transportation, mobility, and simply being able to move from point A to point B as a natural part of life. These young people do not expect their parents to drive them everywhere; rather, they aspire to act as independent individuals.

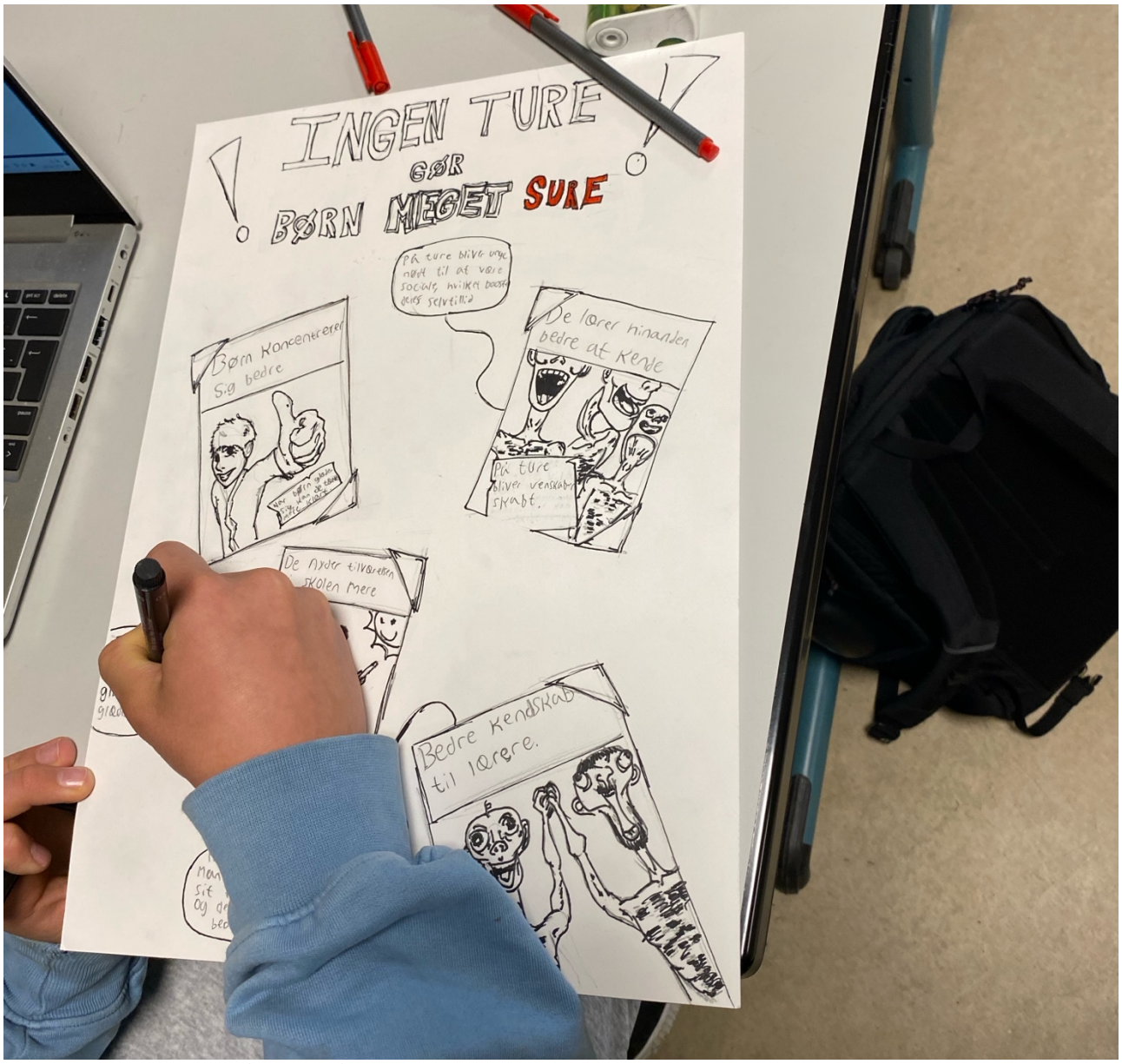

Figure 5: Campaign creation from one of the groups

5. Next steps

In the upcoming phase of the project, staff at Ung Ringsted will work on transforming the insights into communicable material. In Danish municipalities, it is customary for a child and youth policy to take the form of a written document outlining a set of overarching principles or values, possibly supplemented with illustrations, headings, and quotes. However, there is a risk that such a document remains static — posted on municipal websites but not actively communicated, implemented, or continuously developed. In Ringsted Municipality, the aim is to challenge this traditional format and explore new approaches to what a child and youth policy can be. The intention is to create a policy whose format directly reflects the insights gathered in collaboration with the municipality's children and young people. This might involve something more tangible, experiential, or interactive—such as an experience trail, a board game, or even a bus. Additionally, the municipality wants the policy to be perceived not as a final, static product but rather as an organic and dynamic framework that evolves and actively engages with the citizens of Ringsted.

6. Conclusion

The study has shown how it is not necessarily unwillingness to involve children and young people in the making of new policies, but to some extent the unawareness of relevant methods to do so that might keep them from doing so or instead relying on less nuanced methods that might provide a more two-dimensional image of a topic. This calls for more collaboration between the public sector and designers, and this study therefore presents findings from such a collaboration towards the inclusion of a specific target group in a more democratic approach to policy-making. Having a playful approach to data-gathering methods when working with children and young people can support their participation, evoke curiosity and make the participants engage more, while also provide valuable insights to the policy-makers.

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FULL INCLUSIVE PARTICIPATION (FIP) APPROACH: DESIGN PROCESS CASE STUDY IN URBAN MOBILITY

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ABSTRACT | Inclusive design minimizes product and social issues by considering a full range of human diversity (Microsoft, 2015; Connolly & Hyland, 2020). However, proposed specialized methods are underutilized in practice (Holmes, 2018) due to varied concerns. Urban mobility is an important subject because it affects people's daily lives and excludes a growing number of groups (Molina & Garcia, 2013; Creger et al., 2018). How do we adopt inclusive design into mainstream projects and teams? This research identifies strong inclusivity and pragmatic implementation. We devise and explore Full Inclusive Participation (FIP), combining conventionally used design methods with equitable and participation of experience experts in the design team throughout the process. The first case study compares an example of a mainstream designer team to the FIP team, comprising designers and people with visual impairments. The process was captured, participants were interviewed, and mobility design experts evaluated the solutions. The findings contrast many previous sources regarding efficiency and implementation and show a positive impact on designers' inclusivity, confidence, and knowledge. Team management challenges and implementation conditions still need to be explored. Open-source tools could be used while parallelly familiarizing more designers with the approach.

KEYWORDS | Design Process, Inclusive Design, Full Inclusive Participation, Urban Mobility

1. Background

Design and designers have the power to influence interactions, which means that design is often the source of mismatches but can also fix them. This is because the traditional process often oversimplifies user understanding and user diversity through methods such as 'personas' instead of engagement (Holmes, 2018). Accessibility is often used to tackle these issues and is vital for some individuals. However, education gaps, noise in the system, tools unfit for design (Holmes, 2018), overlooking of the psychological aspects and dignity, and disregarding people who do not experience recognized disabilities (Lim et al., 2016) prevent its effective use outside legal obligations.

Inclusive design can be used to minimize product and service issues and grow organizations and communities by considering a full range of human diversity in the design process (Microsoft, 2015; Connolly & Hyland, 2020). Building on the positives, many new inclusive methods are being proposed, from exclusion audits, expert appraisals, user trials, usability studies (Waller et al., 2009), exclusion calculations (Goodman-Deane et al., 2014), extreme user interviews (Brown, n.d.), and critical user forums (Dong et al., 2005). However, despite its potential and decades of research, inclusive design remains underutilized in practice (Lim et al., 2016; Holmes, 2018) because of a lack of knowledge and proper tools for effective practice (Goodman-Deane et al., 2014) and a profound difference between this proposed theory and what can be done in practice (Dong, 2002). As user involvement is described as a key component of human-centered design and inclusive design (Sanders & Stappers, 2008; Hodson et al., 2023), researching inclusive participation is a logical direction. Participatory design (PD) or co-design represents collective creativity in the entire design process (Sanders & Stappers, 2008), but its inclusive involvement is not adequately explored (Raviselvam & Wood, 2021). This is important as a more inclusive process with user participation should lead to more inclusive outcomes (Petronelli, n.d.), which are noticeably missing in many products, services, and systems in our society (Microsoft, 2015; Naumoska, 2024).

There are many design disciplines, especially urban planning and design, and subjects, such as digital technology or health and wellbeing, where this is a far-reaching issue, and the lack of inclusivity can influence other facets of individuals' lives and group and societal levels (Fletcher et al., 2015; Costanza-Chock, 2020). The pressing need is expressed in urban spaces and mobility, with many research and pilot projects observed exploring inclusive design and PD in policy and planning. However, rarely can we find examples focused on wider implementation instead of generating knowledge or where it spilled into the design part of the process. Urban mobility could be important as a subject because cities are complex spaces of ownership and power struggles (Molina & Garcia, 2013), with an example of predominantly minority and worker urban neighborhoods being demolished for urban renewal in the US (Kramer, 2018), and mobility is one of the key areas affecting people's daily lives, with the World Health Organization identifying it as a significant contributor to disabilities. With the lack of inclusive design, social factors of exclusion are amplified, mobility disadvantages are created (Durand et al., 2021), and the urban space is unequally deformed by the continued car-centric approaches to planning and design that exclude or mismatch a rising number of groups (Mattson, 2012; Creger et al., 2018).

In conclusion, the inclusive qualities and methods of the design process can be linked to its inclusive outcomes. To design solutions to mobility mismatches and solve complex issues in cities, after decades of studies, we should have inclusivity in mainstream

projects (Bontoft & Pullin, 2003; Holmes, 2018).

2. Methods

2.1. Research Approach

How can we achieve inclusive design adoption by designers and organizations working on mainstream projects? To address the gaps and avoid the pitfalls of past research, this study identifies that the process should stay strongly inclusive and adopt pragmatism for usability and implementation. We devise and explore the Full Inclusive Participation (FIP) approach. The exploration starts with its definition as combining full participation, which is equitable and has agency in the team, with inclusive choice of participation groups to engage those usually excluded by the design subject, and all of this in the entire duration of a design process that is conventionally or predominantly used in that particular field. Could the FIP approach address both the quality of inclusive design in a broader range of projects and its barriers to utilization in teams and organizations?

As the first step of the exploration, the study framework aims to compare the mainstream designer team with only designers to the FIP team comprising designers as process experts and excluded users as experience experts, using the same process and methods to design a solution (Figure 1). This will provide insights into the similarities and differences between the FIP and the conventional process and, thus, the initial themes for further exploration of the conditions for implementation. To understand the conventional mobility design process and the place of inclusive design, we conducted a preliminary study with four diverse mobility design experts: a public transit designer, a car designer and lecturer, and two public transit mobility planners. They contributed some varied insights, which opened the question of usability conditions of the FIP in different disciplines and projects but with glaring commonalities. Accessibility is mainly adhered to through mandatory ADA guidelines and policy and is seen as a hassle due to that format. On the other hand, while understood and valued, inclusivity and participation are not considered outside of specialized purposes due to a lack of time and resources. Finally, they all think inclusivity and users should be a more significant part of the process and should be involved from the brief generation. The final contribution that all mobility design experts agreed to is to evaluate the designs proposed in the main study as a part of the debriefing interview.

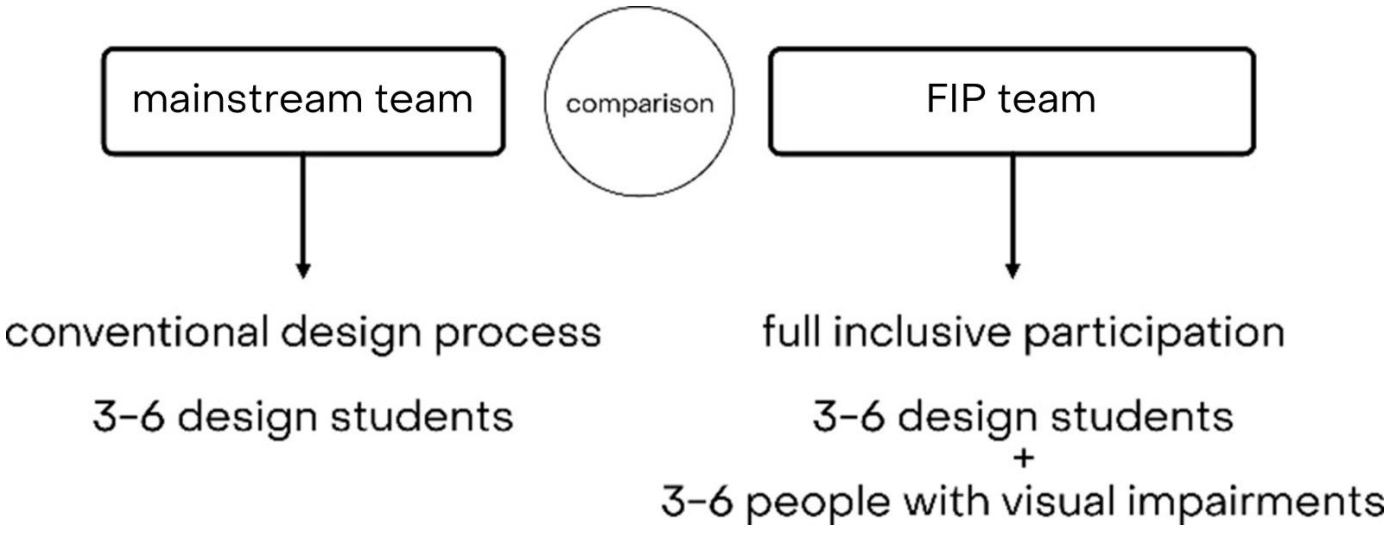

Figure 1. The case study comparison framework with processes and participants, where the FIP approach and experience experts as participants are added to the conventional process.

2.2. Data Collection Methods

The first case study was done with persons with visual impairments as experience experts in urban mobility, and it was for a project for a local public transit service provider in Cincinnati, Ohio, USA. Two participant profiles are recruited for this study: design students with professional experience and bus users with visual impairments. In the first group, six students were recruited, and in the latter group, six legally blind persons. This disability was chosen through the purposeful sampling approach (Lim et al., 2016) as one of the groups experiencing the most extreme exclusion in mobility, with 79% reporting problems in employment or education because of mobility disadvantages due to public transit travel issues (Bleach et al., 2020). Further diversity, such as having different excluded groups in the same team, is not considered in this case study but is proposed for future case studies. Additionally, due to the specific nature of the chosen participants, the study uses a custom ChatGPT facilitation tool developed by the primary researcher to assist teams with project information, methods, and communication. Its impact will not be evaluated in this study. The organization's Internal Review Board approved this study for human subject research.

According to the preliminary study, the case study's mobility design process consists of four phases (Figure 2): Planning – where the teams integrate experiences and refine the brief; Research – where they analyze trends and factors and craft user journeys; Ideation – where teams generate a volume of ideas and evaluate them; and Prototyping – involving iterating and refining ideas into a solution. Both teams follow these methods, and the goal and process framework are outlined in the initial brief, but the key difference is the added FIP approach in the FIP team.

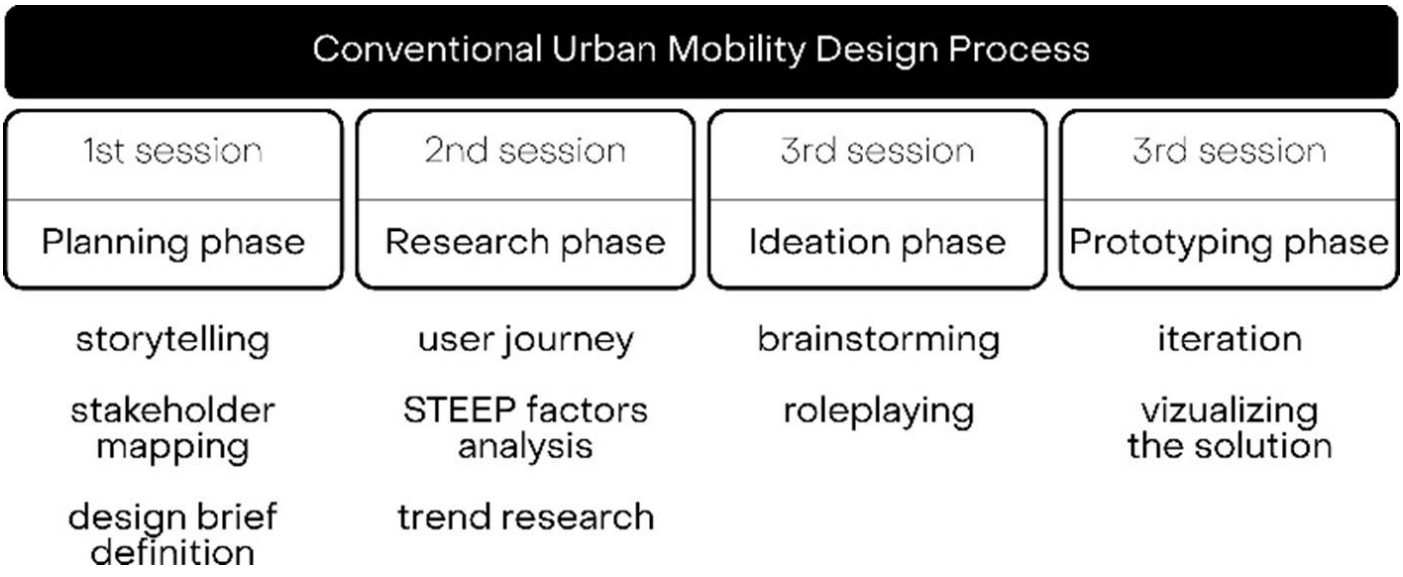

Figure 2. The design process used by both teams in the case study with one phase per working session and listed methods proposed by the facilitator (team lead).

The design process case study was conducted over four three-hour sessions for each group. They were provided access to sheet paper, stationery, the internet, a digital whiteboard, facilitation, and food and water. The groups met at different times in February

2024, and the investigator was always present. The facilitator fostered group dynamics like a team lead in an organization practicing design. Logistics, facilitation, and data collection were all planned not to interfere with the process.

2.3. Analysis Framework

To explore the impact on the process, designers involved, and outcomes, (A) the process was captured, (B) participants were interviewed in each stage, and (C) mobility design experts evaluated the solutions' design qualities, inclusivity, and feasibility. All three were analyzed for both teams and compared.

A.
Data collection was done through process photography and material collection. The group comparison was made session by session and then over an entire process.

B.
Qualitative data was gathered from participants using semi-structured interviews with the same four open-ended and three closed-ended questions at the case study's start-, mid-, and endpoint:
1) What do you think about today's session and the methods used?
2) What do you think about the progress that the team is making?
3) What do you think about the possible solutions?
4) What do you think, and how do you feel about inclusivity now?
5) Did you feel included in this process, and when?
6) Did you feel excluded in this process, and when?
7) Would you participate in a design team or process like this again, and why?

C.
The solutions from each group were evaluated on their inclusivity, form, functionality, and feasibility by interviewing mobility design experts from the preliminary study through semi-structured interviews with blind solutions presentation.
Thematic analysis of qualitative data was done by coding inductively in the first and deductively and contextually in the second phase, allowing for analytical comparison between codes, study groups, and interview sessions. Those connections were explored using visualizations and data sheets to compare co-occurrence, interview occurrence, frequency of mention, and overall volumes. Everyone participated in all sessions except one exclusion expert user being absent during Research and another during Ideation, while the AI facilitation tool was used on only a few occasions without much impact on the process.

3. Initial Findings

Systemic and varied differences were observed between the compared groups in each phase and method, confirming the first part of the hypothesis.

3.1. Per Data Collection Method

A.
The FIP team followed the proposed study framework more closely but with less self-

awareness and more facilitation to articulate project goals and design process, which means additional complexities were introduced that affected time and collaboration efficiency and could add to team preparation and management. The team's language and approach to methods and solutions were notably more empathetic and inclusive than the designer team. Expectedly, the users in the FIP team were most engaged during the planning and research phases, while designers from both teams peaked in ideation. This shows that both participant groups organically adopted their respective roles in the team, and designers' roles were not disrupted. Figure 3 shows how the sessions looked like and operated in the two teams.

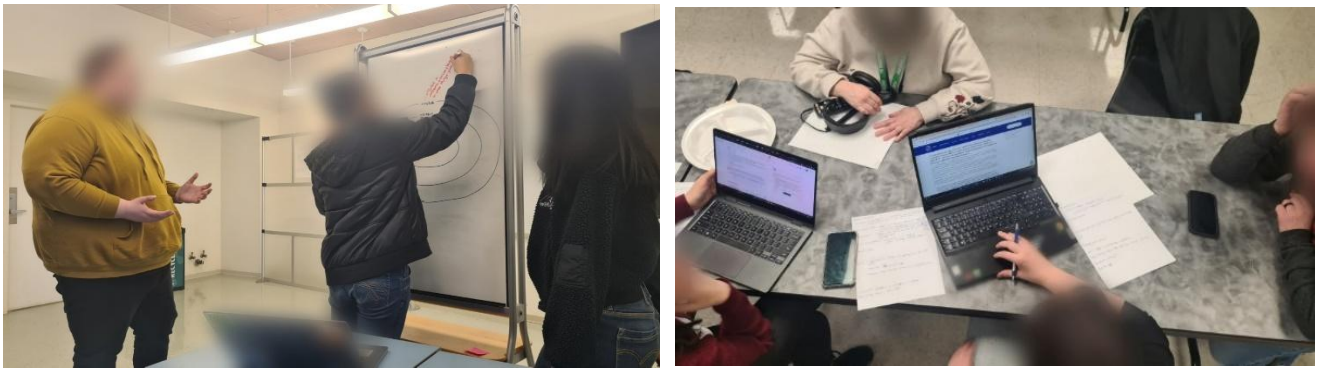

Figure 3. Photographic material from the sessions. Mainstream designer team (left), and FIP team (right).

B.

B.1. On the Design Process

Designers from both teams viewed the design process as mainstream or used by them, confirming the preliminary study. In comparison, due to the FIP, continuous participation was mentioned to increase designer understanding of the topic space, and empathy to eliminate the need for more process structure and specificity and increase productivity in planning and research. The FIP approach also facilitated user understanding of design.

B.2. On Team Collaboration

The case study depended on teamwork and collaboration more than anticipated due to time constraints. The conversation was a key element, especially in the FIP team, where it changed how designers considered users, from 'users' whom they 'design for' to 'experts' whom they 'design with'. This confirms that the approach is strong in inclusive design goals.

B.3. On the Impact on Designers

Comparatively, the FIP approach positively impacted designer participants as professionals and humans and boosted their knowledge and confidence in this case and for future inclusive and mobility design projects. This could be a benefit even outside inclusive design, allowing better team preparedness for different projects and topics. The FIP team designers considered its use in their practice and design disciplines, which is a positive sign for implementability with design practitioners.

B.4. On Challenges

The designer team's challenges centered on limited time, lack of user interviews, and insufficient topic understanding. Conversely, the FIP team struggled with tool use, technological issues, and barriers to collaboration and creativity. Challenges often stemmed from the case study's design, like time constraints or an imbalance of users to designers in the team. They highlighted the need for thorough preparation and

facilitation, which could require additional effort from team leaders or organizations.

C.
Two experts from the preliminary study evaluated the solutions (Figure 4), which were different with their target stakeholders and design media choices. The first expert appreciated the designer team's broader scope and important issues but found it superficial and unclear. The second expert found it well-executed but unengaging and not as inclusive enough. For the FIP team's solution, the first expert observed that it is less systematic but more inclusive. They highlighted the functionality and feasibility of manufacturing costs. The second expert critiqued its unfinished aesthetics and appreciated a more inclusive and implementable product with greater potential. The first expert also thinks they have equal value, while the second expert deems them too different to compare. Both explained their guesses of which solution is the work of which group as a recognition of their own bias. Those insights can help frame the opportunities and limitations. They conclude that there is a specific value to the FIP approach that should be further explored.

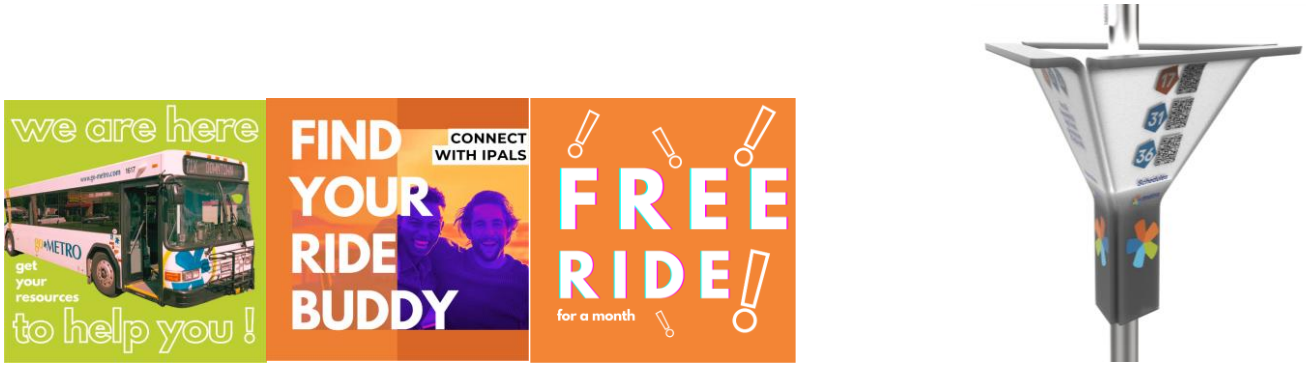

Figure 4. Design solutions. The mainstream designer team (left) created an information campaign focusing on social media and ride buddy programs to bring the information to new and diverse riders. The FIP team (right) created a multisensory and low-cost signage pole retrofitting system to increase environmental visibility, presence, and safety for more potential and current riders.

3.2. Insights

These findings contrast many previous studies and industry practices regarding the ease of inclusive design adoption and implementation – as participation and inclusive design do not have to be more costly or time-consuming, inexperienced users can adapt to an expert design process quickly and designers inexperienced in a certain subject can learn more quickly, developing specialized methods is not necessary for participative design, and constant participation appears to have significantly more worth than intermittent user interviews or workshops. However, this is connected to specific conditions for implementation – the number, diversity, and experience of team members from each participating group, tools and materials that can be used, number and experience of leads or managers, scope and complexity of the project, and the context of the organization were all mentioned by participants and experts.

4. Discussion

Researchers agree that most design disciplines and even project subjects are connected or similar enough, which means advances in usability and adoption of inclusivity could

continue into all other fields where designers are a part of a project. That common denominator is the practitioners - designers.

With this in mind, the innovation of connecting conventional methods and inclusive participation throughout the process was linked to increased designer inclusivity, awareness, learning, and confidence – in their work, profession, and personal lives. These insights open the conversation about FIP as a more powerful tool for inclusive and other corporate, educational, and societal goals. The approach could empower both designers and communities by making designers better equipped for the job market and the challenges of the future, and vulnerable groups could acquire new skills and decision-making voices (Accting, 2022). The explicit willingness and ease of adoption by both participant groups is a positive development for the pragmatism and adoption part of the FIP approach.

We can conclude that knowledge generation is still needed, albeit through the lens of practice and wider adoption. The observed novel themes in inclusive design theory and conditions of implementation need more focused exploration to determine the scopes of inclusivity, participation, and facilitation, the concrete impact on organizations and team leads, the choice of tools to be used, and compatibility with different design processes and disciplines. Due to its explorative nature, the case study had limitations. Further studies should involve mobility design experts and actual organizations practicing it, as well as explore implementation in more complex design projects, organizations' employment and community outreach practices, and designer education.

Some of the proposed steps to further research are already underway with the help of a public transit agency, an organization employing staff with visual impairments, and a university lab, who are interested in implementation or contribution as stakeholders. The wide array of possible case studies to address specific conditions of implementation will be addressed by developing and sharing open-source tools to reach real-world environments and projects more quickly and in a more decentralized and democratized way. This could also familiarize more designers with pragmatic approaches to inclusive design.

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ISSUES TO CO-DESIGN PUBLIC POLICIES FOR INCLUSIVE EDUCATION: PERCEPTIONS BASED ON EXPERIENCES IN A PUBLIC UNIVERSITY OF HEALTH IN BRAZIL

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ABSTRACT | Inclusive education in public universities of health is crucial to foster environments that reflect the diversity of society and seeks to promote equal opportunities for all. Ensuring inclusivity and respect for diversity in these educational institutions is a step toward reducing social inequalities and advancing social justice, on a broader scale.
However, while public universities of health should be spaces for democratic debate and the construction of collective knowledge, there are still significant barriers in place. These include limitations in access, discriminatory attitudes, unequal opportunities, and a lack of respect for the community diversity. These challenges hinder the advancement of social justice within these educational environments.
In this sense, the objective of this study is to present perceptions and identify issues to be worked on by educators, students, researchers, public policymakers, and citizens, with the goal of co-designing public policies that promote inclusive education in public universities of health, reduce prejudice and exclusion, and elevate the debate around social justice in Brazil.
This paper is an experience report, following a qualitative approach, based on the experiences of educators, students, and researchers in an educational environment of a public university of health in Brazil.

Key findings suggest strategic issues to be worked on and co-design by educators, students, researchers, policymakers, and citizens to promote inclusive education in Brazilian public universities of health.
Additionally, the study establishes a strong relationship with concepts of diversity, equity, inclusion, and accessibility, along with inclusive design principles to guide the co-design of Brazilian public education policies, highlighting the impact of these issues on social, economic, and political aspects of health education. The study emphasizes the importance of multidisciplinary, participatory, innovative, and ethical approaches to fostering inclusive education in public universities of health.
The findings underline that public universities of health need to encourage community engagement and democratic debate around inclusive education, which is essential for driving meaningful change.

KEYWORDS | INCLUSIVE EDUCATION, CO-DESIGN, PUBLIC POLICIES, PUBLIC UNIVERSITIES OF HEALTH

1. Introduction

Inclusion has been a widely discussed topic in recent years, driven by social movements, public policies, and international commitments, such as the United Nations (UN) Sustainable Development Goals (SDGs). Specifically, Goal 4 (Quality Education) emphasizes the importance of ensuring inclusive, equitable, and quality education, promoting lifelong learning opportunities for all. Furthermore, Goal 10 (Reduced Inequalities) highlights the need to reduce disparities within and between countries, promoting social, economic, and political inclusion for all, regardless of age, gender, disability, race, ethnicity, origin, religion, or economic status (UN, 2025).
Especially in the context of universities, inclusion and justice serve as the foundation for social networks and interpersonal relationships (Mutanga, 2017), as well as foster the collective participation of everyone in the educational process (Dias Ferrari & Sekkel, 2007) and expand skills, making all people, regardless of their conditions, more economically and culturally productive (Nunan et al., 2000). Additionally, inclusive education programs reduce historically existing inequalities in society (Gorges et al., 2018).
In Brazil, several policies and laws are designed to ensure access to education and reduce social inequalities. These include programs to expand access, affirmative action policies, student assistance initiatives, and accessibility regulations. For instance, Law 10.098/2000 (Brazil, 2000) requires the removal of communication barriers and the implementation of technical solutions to make communication and signage systems more accessible for people with disabilities, including in educational environments. Likewise, Law 13.146/2015 (Brazil, 2015), the Statute of Persons with Disabilities, mandates that the State should guarantee quality education by ensuring an inclusive educational system at all levels of learning.
However, while an inclusive approach is crucial in higher education and there are politics related to the topic, there are still major gaps in its implementation, particularly in terms of architectural accessibility and faculty preparedness to create an environment where all students can engage in academic activities on equal terms (Garcia et al., 2018). Carneiro and Bridi (2018) point out that merely ensuring access for people with disabilities to universities is not enough, as the barriers throughout the educational journey are even greater, with a series of exclusionary mechanisms. The educational infrastructure of most universities remains inadequately equipped to support diversity, primarily due to the

limited availability of accessible resources, the absence of content in alternative formats, and the persistence of attitudinal barriers and exclusionary practices (Jarus, 2022; Beyene et al., 2023).
Within health universities, fostering inclusion is crucial for promoting educational equity and equipping future professionals with the competencies to effectively address the needs of a diverse population (König-Klever et al., 2023; Verbree et al., 2023). The healthcare field can benefit from professionals with disabilities, who bring unique insights and competencies. However, they often encounter numerous challenges, particularly during their training, which can hinder both their success and the profession's access to diverse talent (Walker et al., 2023). Jarus et al. (2022) emphasize that, to ensure health students, regardless of their limitations, feel legitimate and a sense of belonging, inclusive policies and practices must be prioritized in the education system.
In light of this, incorporating the concepts of DEIA (Diversity, Equity, Inclusion, and Accessibility) into health education is essential to ensure equal opportunities and improve the quality of care. Integrating DEIA into healthcare professionals' training helps create a more inclusive environment, sensitive to patients' needs, and promotes better interpersonal relationships. This approach prepares professionals to address diversity in care, helping to reduce inequalities and fostering a culture of respect and equity. Implementing DEIA policies in educational institutions is crucial to training leaders who are more prepared and committed to social justice in healthcare (Rosenkranz et al., 2020).
This vision aligns with the concept of inclusive design, a design philosophy that considers the needs of individuals, particularly those with reduced functional capabilities, during the product design process (Persad et al., 2007). Inclusive design is based on key principles: centering people in the design process, recognizing diversity, offering multiple solutions when needed, ensuring flexibility of use, and creating convenient and enjoyable solutions for all. These principles aim to make environments, products, and services more user-friendly (CABE, 2006), and to make them accessible and achievable by all people, encompassing all forms of diversity (Medeiros et al., 2015). To expand the target audience for products and services, inclusive design considers the desires, needs, expectations, and experiences of everyone (Burgstahler, 2001; Pattison and Stedmon, 2006; Goodman-Deane et al., 2014). The successful implementation of ID strategies requires a deep understanding of population diversity, as well as responses to this diversity, which can be addressed through informed design decisions (Waller et al., 2015).
In this sense, the objective of this study is to present perceptions and identify issues to be worked on by educators, students, researchers, public policymakers, and citizens, with the goal of co-designing public policies that promote inclusive education in public universities of health, reduce prejudice and exclusion, and elevate the debate around social justice in Brazil.

2. Method

This paper is an experience and descriptive report, following a qualitative approach, based on the experiences of educators, students, and researchers in an educational environment of a public university of health in Brazil.

2.1. Overview of University and Students

This report concerns a discussion regarding activities placed at the Federal University of Health Sciences of Porto Alegre (UFCSPA). UFCSPA is a public institution dedicated to teaching, research, and outreach, with a focus on comprehensive healthcare activities.

The university offers 16 undergraduate programs, 64 medical residency programs, four professional health area residencies, nine specialization courses, and 12 *stricto sensu* graduate programs, all in the health field (UFCSPA, 2025). 50% of the student vacancies are destined to individuals who have completed high school in public schools and for students from low-income families. Furthermore, UFCSPA is supported by the Brazilian government through a program that offers vacancies to students from developing countries in Africa, Latin America and Asia. Also, low-income students have support of food, transportation, housing and school materials (UFCSPA, 2025). Nowadays, UFCSPA has 4.250 students, 400 professors, and 200 technical staff. The university does not have an official mapping with data of students, technical staff or professors with disabilities, reduced mobility or specific vulnerable conditions. This is because the current informatized system does not have specific fields for students to inform these conditions in university forms or documents. What is currently available is a mapping conducted by the NID (Inclusion and Diversity Committee) through active outreach to students with disabilities or reduced mobility. This process is still fragile and quite informal, as it is unable to reach students who do not declare that they live with these conditions. Based on the NID's registry, it is known that there are 54 students with disabilities in the university. There are no records for technical staff or professors' disabilities, nor students with reduced mobility or those living in vulnerable conditions.

2.2. Activities Developed

Regarding the activities carried out, they took place in four subjects. Specific meetings with the Committee of Inclusion and Diversity (NID), experts, and members of the university community were also considered complementary and thematically activities, reinforcing the topics addressed in the course.
The subjects concerned design and inclusion of three healthcare courses: two subjects in two undergraduate programs and two in one master's program. The classes took place in 2024. Two subjects occurred in the first semester of 2024. The first one was entitled Accessibility in Health for Medical Physics, and the second one was called Technologies for Inclusion and Accessibility in Healthcare for Health Management undergraduate program. The other two were developed in the Master of Information Technology and Healthcare Management (PPGTIGS). Both courses were taught by a university professor who is also an author of this paper. In the first semester of 2024 occurred Design and Accessibility in Health. Design and Technologies in Healthcare for Inclusion took place in the second semester of 2024. All the subjects are offered every year, for three months and can be taken by students from other master programs (UFCSPA, 2025). All the subjects have a focus on aspects related to DEIA in healthcare contexts.
The undergraduate students are from the courses of Medical Physics and Health Management, and the graduate students are from Master of Information Technology and Healthcare Management. Medical Physics is an undergraduate program that aims to train professionals to work in health prevention and promotion processes by applying concepts, laws, models, and methods of Physics for disease diagnosis and treatment (UFCSPA, 2025). The Health Management undergraduate program aims to train professionals focused on strategic management in health systems, with a systemic vision, an entrepreneurial mindset, and a critical-reflective capacity (UFCSPA, 2025). PPGTIGS is dedicated to conduct research and investigate techniques, methods, and standards related to Health Management, as well as train health professionals to effectively use various information technologies in the health sector and contribute to advancements in health practices and policies. (UFCSPA, 2025).
Meetings with the university community contemplated students, technical staff, professors and rectorate in academic meetings and roundtable discussions about

specific problems or future actions regarding DEIA in the UFCSPA community. In most cases, these meetings consisted of NID members, professors, students and staff who acted as representatives of groups or directories of the university. The Inclusion and Diversity Committee (NID) actions regarded meetings among members of NID and meetings between NID and university community for specific actions proposed by UFCSPA. This Committee is composed of professors, researchers, staff professionals and training students.

2.3. Data Collection and Analysis

The data collection was carried out through field notes and photographs. To develop this study, we initially conducted a literature search, which allowed us to identify the main points related to the themes of accessibility and inclusion within the context of health and education. Based on this search, a set of concepts was constructed to guide the thematic analysis. Next, we carried out the planned activities, observing and documenting interactions through notes, field diaries, and photographs to develop the analysis. In the section called results, we present them organized into categories.
The data analysis was carried out using thematic analysis (Braun & Clarke, 2008) with an inductive approach. While we had support from the literature for the definitions and key concepts analyzed, the categories emerged from what was observed during the activities based on the data collected.

2.4. Structured Plan for Subjects

To organize each subject, we used a plan consisting of a formal structure proposed by the authors, as in figure 1: presenting concepts, cases and examples; researching and exploring; reflecting and analysing; exploring the practical context; proposing an action plan; and concluding with a final discussion and reflection.

Figure 1. Sequence of teaching and learning steps for the subjects

As students were from health areas, generally, they had never heard about design concepts. So, in the beginning of the subject, we started **presenting** concepts and the main ideas of design for health. In the meanwhile, during classes, we covered topics such as DEIA, principles of universal design and inclusive design (CABE, 2006) as well as Brazilian laws, standards, and policies. We presented different types of disabilities, challenges, and barriers faced by these individuals as well as possible opportunities they must have to live a better life. In the subjects that deal with technologies, we presented and included assistive resources and technologies throughout the entire process and discussions.
So, during the first classes, we made theory-driven and discussion-oriented classes and encouraged students to **research** and explore the topics, by doing exploratory research exercises. To engage the students, we encourage discussions about people with disabilities, vulnerable populations and the context of people living in LMICs. We invited people with disabilities to voluntarily participate in the classes, sharing their contexts, the

barriers they face, and their life challenges with the students. Students were stimulated to **reflect** about their context, their families and friends, and their academic and professional environment, trying to identify similar situations faced by them within these spheres. They are stimulated to criticize the current reality and reflect on their role as individuals in a society and how we can be agents of change.
After presenting, researching, and encouraging reflection on the topic, the context of the practical intervention is introduced. At this time, students are motivated and started to **explore** the university environment, researching, visiting and talking with the community. The focus of the intervention is the university environment of UFCSPA, physical or virtual. The students are organised into groups and encouraged to identify the problems and critically analyse the challenges and barriers faced by the community in the current academic context and think about how an inclusive university environment can be.
Students also carried out a practical activity, within their groups. The proposal is for them to put themselves in other people's shoes, that is, to follow a predefined route using a wheelchair, being blindfolded while using a white cane, or using crutches. The idea is for them to develop empathy, learn to see from others' perspectives, and seek to understand realities beyond their own.
They organise data, photos, and reports collected for discussion within the groups. Based on this, they begin the **proposal** for intervention through group work that involves students, people with disabilities, and the researchers involved. The professor supervises the task, always encouraging collaboration through co-participation. In this sense, we discuss people's behaviors, public policies and methodologies, technologies, products and services we could use in an inclusive higher educational context. The ideas that emerge are recorded and discussed, resulting in proposals for intervention as an action plan with educational public policies. There is no prototyping of final products, as these are not design students. What is generated are action plans for intervention proposals, based on the learning and class discussions.
The proposals are **discussed** among all those involved, in a large group. A final report is developed, with a structured action plan, and this document is submitted to the university administration and leaders (program coordinators and the dean) during a debate held in the final class. This document outlines the current problems identified and the possible ways to address these issues, through educational public policies, the attitudinal approach of the individuals as well as products, services, technologies, and information provided. In this way, by the end of the course, the aim is to encourage discussion and reflection among the students on the topic, while also seeking to change the behaviour and the reality of the university, promoting more inclusive, accessible, equitable, and diverse academic environments.
The next section, we present the results structured in categories.

3. Results

The Inclusion and Diversity Committee (NID) includes subcommittees that work on specific issues, such as gender and race, as well as accessibility. NID members meet monthly. However, there are smaller meetings of specific groups for developing research, responding to community demands, monitoring specific actions, and participating in events or selection process committees.
Meetings of NID members bring together a larger number of experts and individuals interested in the topic, who have knowledge in the field and recognise the importance of diversity, equity, inclusion, and accessibility within the university environment and society as a whole. The discussions are more in-depth and frequently include the participation of users directly impacted. People with disabilities, reduced mobility, or in vulnerable situations are closely connected to NID and therefore actively participate in many of the

committee's initiatives.
Another important aspect has been the increased representation of professors from undergraduate and postgraduate courses at UFCSPA. This has led to a greater understanding of the specific context of each course, the identification of students to support who had not previously approached NID, and the strengthening of relationships with course coordination. Consequently, problem analyses have become more accurate, and this process includes the collaborative reflection about the problem, who are involved, and the development of solutions, approaches, and truly inclusive practices, which are treated as a priority.
Meetings with the academic community to address university needs involve students, technical staff, professors and rectorate. These meetings were seminars or roundtable discussions about specific problems or future actions in the UFCSPA community. Problems and future actions range from course curriculum, behaviours of professors and administrative staff, to construction work and maintenance of physical and virtual environments. In these meetings, NID members bring to the table discussions regarding DEIA trying to reinforce the importance of having an inclusive university environment where everyone could feel included and respected. Many of the other participants were part of the administrative and support staff and did not necessarily recognise the importance of DEIA or have knowledge about it. The participation of NID members in these meetings was achieved over the years and, today, is seen as relevant, although it makes some people uncomfortable. This participation has become increasingly relevant as university matters must take DEIA issues into account. However, in some discussions, discomfort was noticeable when addressing these topics, as practices adopted for the majority of people generally tended to follow standard solutions. Considering additional specifications to enhance inclusion and accessibility requires more reflection, work, and adjustments to the standard, which are often avoided.
During the course sessions, several practical suggestions emerged, leading to concrete intervention proposals. To address attitudinal barriers and foster more inclusive education, participants proposed the development of a teacher training program focused on the importance of inclusion. This program would present quantitative data on students with disabilities and reduced mobility and include the voluntary participation of students with disabilities in selected training sessions to share their experiences. Additionally, a mapping of physical barriers across the institution was conducted, resulting in an action plan submitted to the engineering department. The plan outlined suggested modifications to be implemented in the short, medium, and long term. A structured mapping of incoming students with disabilities or reduced mobility is also underway, coordinated by NID. Based on this data, opportunities for dialogue and socialization are being organized with these students to better understand their needs and guide institutional actions.
The following section will discuss the results and practices used in these activities, highlighting perceptions and identifying the issues to be worked on by educators, students, researchers, public policymakers, and citizens. This aligns with the importance of co-designing public policies that promote inclusive education in public health universities, reduce prejudice and exclusion, and elevate the debate around social justice in Brazil.

4. Discussion

The following section presents a discussion of the results, aiming to reflect on the practices and outcomes derived from the activities carried out. This section is organised as follows: contributions of design education and design practice in the context of a

healthcare university, relevance to design public policies with people with disabilities in universities of health and designing public policies.

4.1. Contributions of Design Education and Design Practice in the Context of a Healthcare University

The design practices and education developed made clear the barriers and exclusions experienced by people with disabilities, as well as contributed to the inclusion of users and those directly impacted in discussions and in the design of the university environment. The main barriers identified were related to physical accessibility within the university environment. Although the infrastructure includes some spaces adapted for wheelchair users, access to many entrances is hindered by stairs, and not all areas have tactile flooring. Additionally, in terms of communication, the university lacks Braille signage and auditory signals. Even though there are staff members at the university trained to support individuals with various disabilities, it can be challenging for a person with a disability to navigate the environment independently during their initial contact with the space.

The formulation of effective public policies requires the identification of these barriers and the analysis of data that highlight the inequalities faced by different social groups. The cases, the arguments of people with disabilities, and the Brazilian standards addressing design that were used in the classes reinforced the ideas and proposals. One of these regulations is the Law of Accessibility to buildings, furniture, spaces, and urban equipment, which in its latest revision added the content of the seven principles of universal design to its text (ABNT NBR9050, 2020). Another design concept worked on in class was the principles of inclusive design, where students were able to realise the importance of DEIA for the university context of health courses and for society as a whole. Bringing people with disabilities into the classroom, into activities, and meetings where they could actively participate also contributed to reflection, empathy, problematisation, and the subsequent search for ways to make the university environment more inclusive.

The development of public policies must come from a participatory approach, ensuring that decisions are built with the direct collaboration of the people affected. The theory and relevance of co-design, involving those directly impacted, were presented to the students. This participation and involvement sparked reflection and critique about current public policies, and the students were motivated to debate and propose new ideas, together with people with disabilities.

People with disabilities also emphasised the sense of belonging and satisfaction from being heard, having their participation in the community recognised, with their ideas, feelings, and values considered. According to Simplican et al. (2015), community participation of people with disabilities generates the involvement in community activities that promote the development of interpersonal relationships. This recognition also aligns with issues related to social justice, which guides public policies focused on equity and the guarantee of rights. By the end of the subject activities, it was possible to observe, through the students' statements, attitudes, and stances, the gradual development of a relationship of trust and respect among the participants. Building a more inclusive environment in the university health context can drive broader structural changes, influencing institutional and governmental policies.

The combination of several techniques used in the sequence of teaching and learning steps, as shown in figure 1, was also assertive, as the set of actions carried out in the classroom enabled students to understand, sensitise, and engage with the theme throughout the entire work of the subject. Moreover, the use of active methodologies in teaching and learning favours the understanding of the challenges and barriers faced in

the implementation of inclusive public policies.

4.2. Relevance to Design with People with Disabilities in Universities of Health

In all the subjects, we brought people with disabilities who voluntarily made themselves available to participate and co-design in some moments of the classes, such as discussions, debates, interviews, testing and criticizing the ideas and solutions. Rajapakse, Brereton and Sitbon (2019) define co-design as an established field of inquiry that involves people with a variety of interests and skill sets to design together. Sanders and Stappers (2008) add that co-design is a collaborative process that involves different participants contributing their experiences, knowledge, and creativity.

The participants' disabilities were studied and taken into consideration to ensure their effective and respectful participation. Possible barriers to communication and participation were identified, and appropriate devices, technologies, and flexible approaches were selected to prevent and eliminate these barriers or potential discomfort during the proposed activities. Labattaglia, Reay and Nakarada-Kordic (2023) state that accessible co-design accommodates and encourages multiple modes of communication and participation. Allowing participants to engage with a co-design method or activity in any way or style was found to be the most accessible way to approach co-design (Labattaglia et al., 2023). This approach aimed to guarantee the proper, ethical, and respectful inclusion of people with disabilities or reduced mobility during activities.

The activities carried out that included people with disabilities or reduced mobility reaffirmed the importance of giving voice to people with disabilities — whether through the sense of belonging it generates, the broadened perspective on different realities, or the increased accuracy in proposals. This aligns with the guiding principle of people with disabilities: 'Nothing about us without us' (UN, 2004). United Nations (2004) emphasizes that the active involvement of people with disabilities in developing standards is a strong example of how full participation can be implemented, contributing to inclusive societies where all voices are heard and people with disabilities can help shape a better world. Bohn et al. (2023) recommend that the design of these laws and regulations includes participatory processes for different actors, aiming to obtain different perspectives on the same issues.

An important point for analysis is the specific context of health universities, which have a series of particularities in teaching and learning, such as clinical practice activities, the use of specialised laboratories, and hybrid classes (both virtual and in-person formats). These activities take place in environments that involve the use of health-specific products and technologies, requiring reflection and analysis to effectively transform them into activities that consider diversity and are truly inclusive, ensuring accessibility for all. Furthermore, these students will become future healthcare professionals who must develop an understanding of and respect for differences. Meeks and Jain (2018) advocate that disabilities must be fully integrated into diversity and inclusion discussions at medical schools and universities of health. The authors add that diversity and inclusion in the medical student body are associated with greater self-rated preparedness to care for minority patients and a stronger commitment to equitable access to care (Meeks & Jain, 2018).

The activities carried out also highlighted the importance of integrating key individuals into certain administrative sectors, specific areas, or faculty groups. These individuals would be influential persons who are trusted by their teams and can serve as references for promoting and advocating for respect for diversity, as well as for the ongoing pursuit of accessibility, inclusion, and equity within the university environment. While this is a

topic that should be further explored in future research, it became evident in the activities conducted as a potential strategy to be adopted. Another issue that emerged from the activities and warrants discussion is the importance of peer relationships. Fernández-Batanero, Montenegro-Rueda and Fernández-Cerero (2022) reinforce the relevance of peer support as a good facilitator and favour the participation of students with disabilities in classes and academic activities.

4.3. Designing Public Policies

In Brazil, the evolution of regulations can be observed, with some addressing the real needs of people with disabilities or reduced mobility, while others incorporate contemporary concepts and universal design principles, (ABNT NBR9050, 2020), which undergo periodic updates. Bohn, et al. (2023) emphasize that in recent decades, Brazil has made progress in legislation and public policies aimed at inclusion, encompassing inclusive education, healthcare services, and labor market integration. Nowadays, the country has a set of laws, standards and policies that govern accessibility, inclusion, and health, seeking to guarantee the right of access of all people (Bohn, et al., 2023).
At the same time, by the end of the classroom discussions and some meetings, the gaps that many regulations, laws, and standards still present became evident. Certain challenges in public policies in education were highlighted, such as the constant need for updates and improvements in degree programs curricula, the difficulty of accessing some regulations and legislations, as well as the necessary advancements in communicating them. Lee et al., (2021) advocate for incorporating disability into medical education, ensuring that healthcare professionals are trained to provide inclusive and quality care to people with disabilities. About educational policies, Fernández-Batanero et al. (2022) also highlight the necessity of curricular adaptations to contemplate the real needs of the community. Another issue that came up for discussion in activities is the lack of effective implementation of public policies in education. Kelly, Padden and Fleming (2023) said that in Ireland's University there was an 'inclusion implementation gap' and in the case of University College Dublin, they created a culture of inclusion engaging leaders, university community and students. Although the implementation of legislation, standards, and policies was not the focus of this work, the discussion frequently emerged during the activities. Aligning with Kelly et al. (2023), the support from rectors, chancellors, and senior leadership in disseminating, endorsing, and ensuring compliance with DEIA initiatives is another aspect to be considered for the effective implementation of actions and public policies in universities of health.
For the design of public policies, it was possible to perceive the importance of the approach and interactions between users and those impacted with the university community, to ensure that these proposals address their real needs and that all voices are heard. Kelly et al. (2023) add that students can be powerful catalysts for change and their role as 'ally' is integral to the implementation process. As highlighted by Meeks and Jain (2021), inclusive policies are essential to overcome the barriers faced by students with disabilities in accessing and participating in higher education, and they can be active participants of this change.

5. Conclusions and Ongoing Work

This paper aimed to present perceptions and to identify issues to be worked on by educators, students, researchers, public policymakers, and citizens, with the goal of co-designing public policies that promote inclusive education in public universities of health, reduce prejudice and exclusion, and elevate the debate around social justice in Brazil. As

lessons learned, all the activities in this experience report have shown us that design practices and design education can foster reflection, encourage, and provide a more inclusive, equitable, and accessible environment that respects our great diversity. Furthermore, the importance of involving people with disabilities throughout the activities was evident, to ensure that all voices are heard, especially in the university context of health-related courses. Another lesson learned is the importance of co-design, participatory and ethical approaches to fostering inclusive education in public universities of health to enhance community engagement and democratic debate to meaningful change. The work developed with and for people with disabilities shows the community involvement and the behaviour change, focusing actions more on abilities than on people disabilities. The study also showed the difficulties regarding implementation of public policies and how important is the students' role as powerful catalysts for change.

Another aspect observed is the impact of these issues on social, economic, and political aspects of health education and in the society as a whole. The discussions and classroom work began with an analysis of the context of a public health university and its community but expanded to broader spheres of public administration. Students realized that while it is necessary to change our behaviour within the university community, among friends, and with those close to us, there must also be more structural changes at the political, social, and economic levels. These observations enriched and elevated the discussions, allowing participants to recognize their roles as citizens within a society and understand how their actions are essential for social justice.

The findings from this experience can be adapted and replicated in other university contexts, especially those involving health education, by establishing inclusive committees, integrating co-design practices in the classroom, and creating structured opportunities for people with disabilities to contribute to policy-making processes. Other educators and researchers can build on these insights by incorporating active learning methods, participatory approaches, and DEIA-focused discussions into their curricula, as well as promoting interdisciplinary collaboration.

Based on our experience, we recommend that institutions: establish formal mechanisms to include people with disabilities in policy and curriculum discussions; provide continuous training for faculty and staff on inclusive practices; design mapping and monitoring systems to identify and respond to accessibility barriers; and promote the presence of diversity advocates within academic and administrative structures.

For future studies, it is suggested that the topic be explored in greater depth through case studies or other qualitative research methods. Another possibility is to investigate the implementation of actions and inclusion policies within the context of health education at the university level. Moreover, future research should explore methods and tools for measuring and evaluating behavior change and student engagement, as these factors are crucial for understanding the long-term impact of such educational interventions. These future studies could also examine the institutional conditions and leadership engagement necessary for the effective implementation of DEIA initiatives, as well as the role of peer support and collaboration in promoting inclusive learning environments.

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LOCAL AUTHORITIES, ARTISTS AND INTERMEDIARIES WORKING IN SYNERGY TOWARDS JOINT GOALS: CAPACITIES NEEDED FOR PURPOSEFUL COLLABORATION WITHIN THE CCI4CHANGE FRAMEWORK

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ABSTRACT | This research focuses on establishing purposeful collaboration between local authorities, artists, and intermediaries working in synergy. Drawing on insights from the co-creation of the emerging CCI4Change collaboration model and five case studies, the study advocates for a systematic approach to local authority-driven partnerships with artists to achieve enhanced sustainability. The research examines the key factors required to foster collaboration, addressing the key capacities of each actor, local authorities, artists, and intermediaries, while also identifying the prerequisites and obstacles for a purposeful and successful collaboration. The study underscores the importance of motivation on the part of local authority, which must possess the capacity to contextualise the novel collaboration in a

meaningful and strategic way. Artists, in turn, need strong professional artistic skills and the motivation to work in a goal-oriented way. The intermediary's expertise within the CCI (Culture and Creative Industries) community is critical in fostering dialogue and trust between the two parties. The study employs a qualitative approach with a limited number of case studies. While the findings provide valuable insights and offer valid considerations for fostering purposeful cross-sectorial collaboration, they also suggest transferability to similar initiatives. This knowledge supports the application of the CCI4Change collaboration model, as well as other similar models, aimed at facilitating the systemic implementation of novel, local authority-driven creative collaborations to foster community sustainability and innovation.

KEYWORDS | SUSTAINABILITY, ARTS-BASED COLLABORATION, CROSS-INNOVATION, PARTNERSHIPS, ACTION RESEARCH

1. Introduction

The world is facing a climate crisis. Europe is striving to become carbon neutral by 2050, a cornerstone of the European Green Deal (European Parliament, 2021). Art and design are called on to take a stronger stance in providing solutions and redefining their role in addressing ecological and societal conflicts (Ciravegna et al., 2022). Ethical design leadership is crucial in cross-innovation efforts aimed at integrating creative competencies, guided by sustainability principles, UN 2030 goals, and the urgency of tackling wicked problems, and new forms of collaborations are needed to find synergies and unexplored possibilities to enhance sustainability and the green shift (Bandarin et al, 2011; Hasagharar, 2017; Soini & Birkeland, 2014; UCLG, 2018).

A diverse range of skills and approaches from different disciplines is essential for finding new solutions and creating robust knowledge, e.g. research with and for society via stakeholder integration (Nowotny et al., 2003; Weingart, 2017). The research is based on the CCI4Change (CCI as in Culture and Creative Industries) collaboration model, a novel approach created via participatory means (Robertson & Simonsen, 2012; Spinuzzi, 2005). This study explores the essential factors required for fostering a purposeful collaboration between local authorities and professionals in the field of culture and creative industries, and especially artists, within the context of the green shift, sustainability transition and transformation.

The study resonates with the growing interest of both parties, local authorities (city, municipal and regional public officers) and artists from diverse fields of arts: visual arts, performing arts, media arts and more, to explore new ways to collaborate to create positive impacts on the sustainability of their communities. The power dynamics between artists and local authorities are inherently distinct, often leading to discord and misalignment in working cultures, where communication barriers and differing priorities create challenges. Artists play a crucial societal role in critiquing, influencing, and shaping their surroundings, while local authorities hold the mandate to direct societal development and stir citizen behaviour. Despite their respective influence, meaningful collaboration between these two entities remains uncommon. Harnessing their complementary strengths for shared objectives could, however, yield significant societal benefits. To a large extent, artistic and creative actors consist of individuals or small organisations that often occupy a precarious position and operate with limited resources.

In contrast, the local authority is a powerful and strongly structured entity constrained by legal requirements and rigid internal processes to which a collaboration must adapt. To help balance this power dynamic, the role of the intermediary is introduced as a key facilitator, bridging the two parties to enable purposeful and productive collaboration.

2. Research questions

The emerging CCI4Change collaboration model explores the potential of cross-sectoral partnerships between local authorities, professionals from the culture and creative industries (such as artists), and intermediaries, working in synergy to influence citizens' energy consumption behaviours. This study examines the key capacities of each stakeholder—local authorities, artists, and intermediaries—while identifying prerequisites and obstacles for a purposeful collaboration.

3. Key concepts

The study contributes to sustainability sciences by examining the role of the arts in sustainability, as in challenging the power dynamics and facilitating futures visioning (Heras et al., 2021). Cultural actions are commonly integrated into sustainability transitions and are recognised as relevant both for short-term experiments and long-term systemic change (Concilio et al., 2023). Art has some potential to act as a catalyst in promoting environmentally positive values, systemic thinking and sustainability initiatives, and cultural sustainability transformation (Huhmarniemi & Jokela, 2025).

Sustainable development has traditionally been defined by three core pillars—economic, social, and environmental—as outlined in Agenda 21 for Sustainable Development adopted by members in 1992 (Agenda 21, 1992). The role of culture in this sustainability framework is widely discussed: how culture contributes to the three existing pillars as an instrument to achieve sustainability, and cultural sustainability as the fourth pillar of sustainability (Soini & Birkeland, 2014; Sabatini, 2019). A conceptual framework for relating culture with sustainability consists of Culture in Sustainability, Culture for Sustainability, and Culture as Sustainability (Soini & Dessein, 2016). This approach has also been adopted in the UNESCO agenda, which is incorporating the framework in its narratives as: (1) culture as an independent pillar of sustainability; (2) culture as a driver of sustainability containing development assets; and (3) culture perceived as a prerequisite for sustainability (Dobrosława, 2020). The first notions of the role of culture are more adopted, such as acts of preservation and integration of cultural values, traditions, and heritage within broader sustainability efforts. Culture as a driver of sustainability is acknowledged as part of areas like health and wellbeing, urban planning, and the role of culture in awareness-raising for desired change. The third perspective, culture as sustainability, relates to a transformative approach that has yet to be adopted and lacks efficient tools to create the needed change (Siivonen, 2020). However, sustainable development has been widely criticised as a politically charged concept with several weaknesses in its approach (Jackson, 2009; Raworth, 2012).

This study contributes to sustainability sciences and the role of arts in sustainability, as in disrupting power dynamics and facilitating futures visioning (Heras et al., 2021). Cultural

actions are commonly integrated into sustainability transitions and are recognised as relevant for short-term experiments and long-term systemic change (Concilio et al., 2023). Art, especially social and pedagogical artistic practices, can initiate sustainability transformations, a systemic change, and shift towards a into sustainability orientation (Huhmarniemi & Jokela, 2025). However, there is a lack of standardised methods among public, private, and non-governmental sectors for monitoring and evaluating their progress in integrating culture into development-oriented initiatives (British Council, 2020).
When artists are invited to move beyond their traditional domains to collaborate with professionals from other sectors and adapt their objectives accordingly, these interactions have been examined within the contexts of health and wellbeing, social sciences, corporate environments, and frameworks of organisational learning. Artistic interventions in organisations, or arts-based initiatives, integrate elements from the art world into non-arts-based organisations to foster learning and innovation (Darsø, 2004; Berthoin Antal, 2012; Schiuma, 2011; Schiuma, 2017). However, there has been limited research on collaborations between artists and local authorities.

Huybrechts et al. (2017) state that participatory design and design in the public realm operate primarily at the micro level, yet they generate many direct and indirect effects on meso- and macro-level institutional frames. As an emerging collaboration model, the CCI4Change responds to the call for research, art, and design to support the necessity and potential of more systemic radical transitions, making them accessible to a wider audience to adopt. It also highlights the role of cultural organisations and universities in demonstrating leadership by actively engaging with radical transition practices in their urban or regional contexts through action research and research-by-design (Loorbach, 2022).

Systemic approaches are crucial for investigating the factors that enable productive collaboration between local authorities and artists. Such an approach can generate the necessary number and quality of initiatives to identify actions that have the potential to tap into leverage points within the system, and through limited interventions, create significant impacts (Meadows, 1999).

4. Methodology and data gathering

4.1. Action research

The research framework is based on action research. Action research is participative and collaborative. Its methods involve action, evaluation, and reflection in an iterative cycle (Cohen et al., 2017; Mc Niff, 2013; Avison et al., 1999). This methodology is increasingly being applied to foster sustainability transformations (Bradbury, 2022) and the sustainability impact of arts and culture (Jokela & Huhmarniemi, 2018; Jokela et al., 2019).

The data is collected through two parallel processes. Firstly, data is gathered from the service design process conducted to develop the CCI4Change collaboration model. Secondly, data is drawn from five case studies that tested the collaboration model in practice. Therefore, the model provides a comparative framework for all five case studies, each of which follows the same structured approach outlined by the model, contributing significantly to the research.

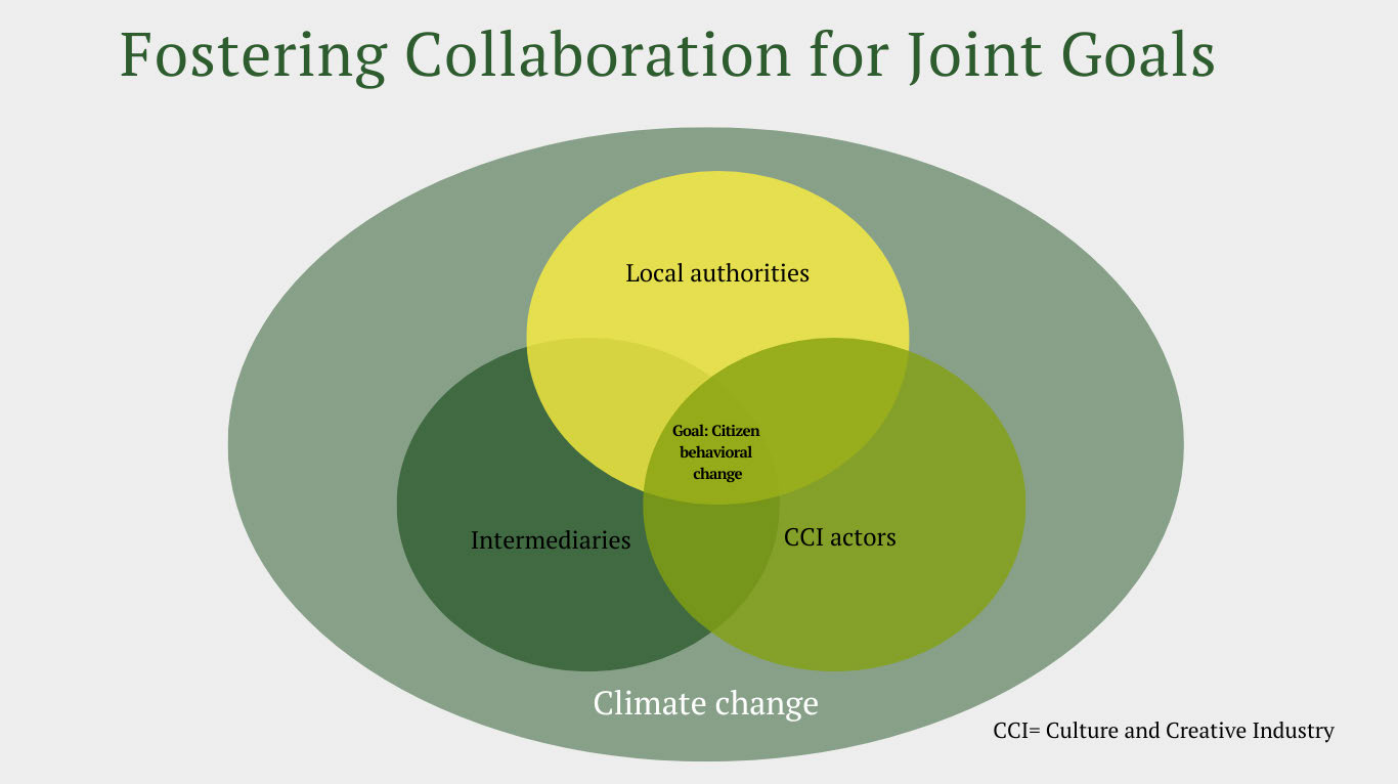

Figure 1. Framework of the CCI4Change Collaboration model.

The research stems from the CCI4Change collaboration model (Figure 1). Despite the CCI4Change collaboration model not being within the focus of this study, it is essential to understand the framework it provides for the research premise, highlighting the roles of the local authority, artist, and intermediary. The research data is derived from the context of the CCI4Change collaboration model, which aims to support local authorities by providing a tool to influence citizens' energy consumption behaviour through the skills and approaches of artists and creatives. The model is based on three key stakeholders—local authorities, CCI actors, and intermediaries—whose ability to work together may be crucial for fostering sustainable solutions. This development work and the research were conducted as part of the EU Interreg Baltic Sea Region Program co-funded project 'CCI4Change: Facilitation of Citizens Energy Consumption Behavioural Change in Baltic Sea Cities and Municipalities' implemented in Latvia, Finland, and Sweden (August 2023, July 2025).

Aligning with the action research approach, the researchers were integral partners of the co-creation and its working groups and facilitated, designed, observed, and participated in the process. While participating and co-designing, they observed and took field notes. The researchers observed the entire service design process and were involved in all co-creation workshops as participants.

4.2. Service design tools

The action research utilised diverse service design methods (Stickdorn et al., 2018). The objective of the service design process was to develop the CCI4Change collaboration model and to test it across five practical case studies. Additionally the objective was to produce a toolkit to support the adoption and dissemination of the model. Co-creation, grounded in participatory principles, provided a central approach that actively seeks to

understand the perspectives of users and stakeholders (Vargas et al., 2022; Spinuzzi, 2005). Various service design methods were employed to gather user insights throughout the process (Stickdorn et al., 2018). A key element was a series of co-creation workshops (September 2023–April 2025), where the model was developed and prototypes were tested at different stages in collaboration with users and stakeholders both in online and onsite settings (Figure 2).

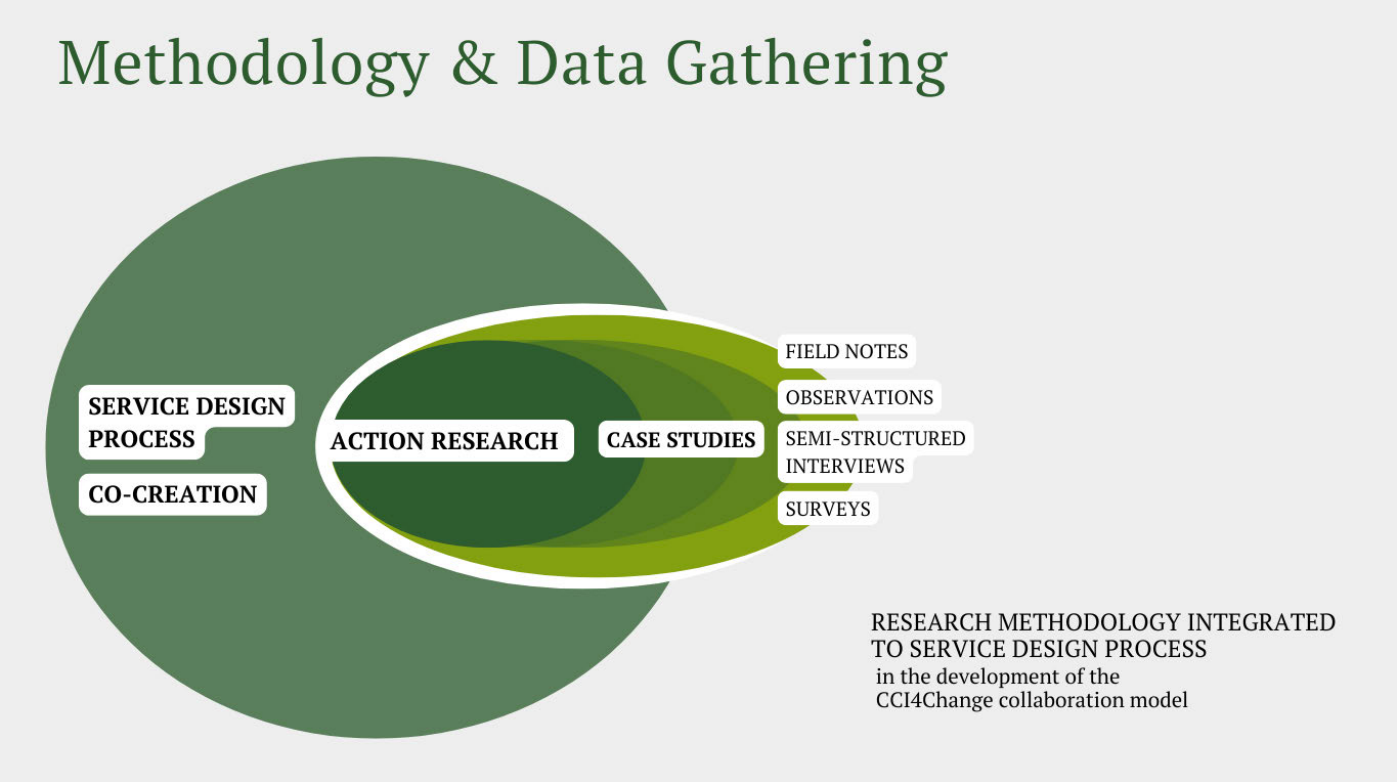

Figure 2. Methodology and data gathering.

Twenty-two individuals from Latvia, Finland, and Sweden contributed to the co-creation. These were grouped into three groups. Firstly, the local authority representatives were public officials mainly working in management or expert positions in cultural departments at the city, municipality, and regional levels. Local authorities also included a director from the city urban development department as well as experts in sustainability and climate issues. Secondly, the intermediaries represented organisations of various kinds, an NGO creative hub, an international public cultural institution, and a public business development agency. Thirdly, a participant group of six artists, as introduced in the case studies, contributed to the research. In addition, five individuals from the universities contributed to the working groups.

User insights and data were collected throughout the process using interviews and surveys to triangulate data-gathering methods (Stickdorn et al., 2018). Semi-structured interviews were conducted with the participant groups of local authorities and artists, which enabled collecting rich qualitative data (Ibid.). In addition, data from the artists participant group was collected through a survey.

4.3. Data analyses

The analysis and conclusions are shaped by the data collected from the co-design process and the five case studies examining the commonalities experienced in them. The results were analysed using an affinity diagram, and the findings were visualised in persona canvases that were created to define key characteristics of the local authorities, artists, and intermediaries—their actions, skills, capacities, and motivations for the collaboration. Additionally, it explored the perceived value and future potential of the model, along with prerequisites for the collaboration as well as barriers that hindered effective collaboration. This process involved identifying key topics, themes, and focus areas that emerged during the co-creation sessions and within the case studies, as well as addressing questions, concerns, and priorities that were emphasised throughout the process. The visualisations served as tools to summarise the key findings capturing the shared experiences and insights of users in the three participant groups. Rather than reflecting individual participants' perspectives, the visualisations synthesise data from multiple stakeholders to present a broader understanding of the collaboration dynamics, thus providing the basis for the analysis.

In this research context, key capacities refer to the essential skills, instincts, abilities, processes, and resources that actors in the collaboration need to possess as relevant for purposeful collaboration. The prerequisites for collaboration refer to the conditions that must be met beforehand and that influence the efficiency of the collaboration. Obstacles are factors that hinder collaboration and negatively impact its success. The case study format was chosen to provide data for comparative analyses across the three contexts and to validate the emerging operational collaboration model (Flyvbjerg, 2011).

4.4. Case studies

The case studies tested the CCI4Change collaboration model in practice, representing a completed collaboration between the three parties (local authority, CCI actor, and intermediary).

All five case studies followed the same process structure and goals provided by the collaboration model from its start to closure. In brief, the collaboration began with the local authority and intermediary preparing to launch an open call for creatives, defining the criteria the applicants were expected to meet. The activities proposed by the creatives were intended to utilise artistic or creative practices to address the goal of reducing energy consumption, ideally in collaboration with civil society by engaging local communities. The outcomes of the creative process could take various forms, such as video, animation, comics, performance, temporary installations, and exhibitions. The expectation was not for artists to provide ready-made solutions to energy-consumption issues, but rather to guide citizens in discovering approaches for behavioural change through creative engagement. The timeframe for the projects was approximately four months, with a financial reimbursement of around €10,000. The open calls were competitive, and proposals that best aligned with the predefined criteria were selected for implementation. Local authorities and intermediaries chose the projects with an emphasis on new thinking and innovative approaches. These artistic pilot projects serve as the case studies for this research.

The study refers to culture and creative industry actors, particularly as artists due to the professional background of the actors represented in the case studies. In summary, the

fields of art and professional backgrounds of the artists participating in this study are music and sonification, cultural productions, ceramic art, game design, media and video art, community art practices, and art installations.

A. Duncan Geere & Miriam Quick: 'On Standby' sonification art
Duncan Geere and Miriam Quick, founders of the Loud Numbers data sonification studio, created a musical composition derived from data collected from individuals about overnight energy consumption. Geere distributed smart plugs that monitored the energy consumption among the participating citizens of Malmö, who collected and shared data. Using data-sonification techniques, this data was turned into a music composition that was 10 hours and 40 minutes in length. The aim of the artwork was to raise awareness of and stimulate discussion about energy use through the simple process of observing and quantifying the electric appliances' energy footprint, which is set to prompt self-reflection of one's own consumption. The activity was enabled by the local authority in the Skåne region and was supported through intermediary functions provided by the creative hub STPLN.

B. Ifö Centre: Zero Sum Residency
Ifö Centre is a free culture house initiated by artists in an old ceramic factory in the small village of Bromölla in southern Sweden. The closed factory property is managed by the international NGO Ifö Centre Association of Arts and Culture, covering 43,000 m², and is being repurposed as a site for art manufacturing and more. hosted a residency for artists with the focus on the Agenda 2030 goals, where creative approaches and solutions for energy saving were produced and discussed together with art exhibition audiences through ceramics and works of industrial design. Teresa Holmberg, ceramic artist, curator, and producer of the Ifö Centre, organised the residencies. The activity was enabled by the local authority Skåne region, and was supported through intermediary functions provided by creative hub STPLN.

C. Tatu Heinämäki & Camilla Pentti: Community Energy Game: 'Energeezer'
Tatu Heinämäki is a visual artist, game designer, and media arts teacher, while Camilla Pentti is a visual communications professional and game designer. In the city of Kotka, a video game was developed that specifically addresses the issue of energy consumption and encourages its reduction. In total, 29 high school students took part in 'game jams' giving their ideas to the development of the final video game. The main goals of the activities were to inspire the children who participate in the development and to raise interest among the citizens of Kotka for the game and to communicate about the energy consumption theme through video gaming. In March 2025, the video game became open to all citizens of Kotka, inspiring future discussions around energy consumption. The activity was enabled by local authority City of Kotka, Finland, and supported through intermediary functions provided by business development organisation Cursor.

D. Banja Media Ltd: Video Pilot: 'No, that's not how you save the world'
Banja Media's pilot activities were produced together with children of various ages in Kotka schools, producing short, humorous yet informative videos on energy saving, circular economy, and sustainable development. The videos represent educational material provided for the children and co-created with them. The goal was to promote shifts towards more sustainable behaviour and to inspire viewers of the videos to think how energy-saving can be possible. Petri Pietiläinen—a professional in children's art and culture and an author—played a key role in organising the video production, writing the scripts, workshopping with youth groups, and acting in the films. The activity was enabled

by local authority City of Kotka, Finland, and supported through intermediary functions provided by business development agency Cursor.

E. Fonds INITIUM: 'Neighbourhood House'

INITIUM is a professional arts and culture platform focused on community art projects. It employs theatre and other artistic methods in sustainable initiatives supporting social, educational, and cultural efforts in Latvia and Baltics. In the Kauguri neighbourhood of Jurmala, a site-specific location for the artistic activity, the team created an environmental installation that aimed to spark discussion on energy consumption, highlighting citizen agency. Within a period of four months, the INITIUM work in Kauguri engaged with 170 inhabitants through brief inquiries extending to in-depth interviews. The activity was enabled by the local authority Jurmala municipality and supported by the Northern Dimension Partnership on Culture as the intermediary of the collaboration. The first author of the research acted as the intermediary between the local authority and the artist in this case study.

5. Results

A comparison grid categorises the features, functionalities, and characteristics of local authorities, intermediaries, and artists within the collaboration. This comparison is based on data collected using service design tools, including the Tree of Change, which focuses on the actions, operations, and connections of each actor, as well as key persona templates, where each actor is represented as a persona with specific characteristics, skills, capacities, values, actions, motivations, etc.

Table 1. Comparison grid.

Category	Local Authority (LA)	Artist	Intermediary
Role in Collaboration	Initiates, coordinates, and supports pilot projects. Mediates between CCI and community. Aligns with city strategies. Provides access to communities and practical support.	Designs and implements pilots. Develops creative methods and tools. Engages citizens. Collaborates with local authority and intermediary.	Provides funding, capacity building, and knowledge transfer. Facilitates communication and outreach. Acts as translator and bridge between different stakeholders in the collaboration.
Key Functions	Open calls and contracting. Coordinates multi-department involvement. Communicates with citizens. Promotes sustainability and transformation through culture. Collects citizen	Proposes and executes creative projects. Engages with civil society and diverse audiences. Creates impactful storytelling formats in versatile art forms	Organises training, workshops, and mentoring. Builds networks. Guides CCI towards transformative action. Ensures competence and project quality. Collects citizen experiences and

	experiences and feedback.		feedback.
Methods & Tools	Strategic planning; public procurement; collaboration across departments; questionnaires	Installations; games; art workshops; exhibitions, community art; digital storytelling.	Training webinars; workshops; questionnaires; communication strategies and campaigns.
Citizen Engagement	Provides infrastructure for participation and dialogue. Supports community access to activities.	Facilitates co-creation with citizens. Uses participatory methods and artworks. Implements art-based processes like games, installations, community art, and workshops.	Designs outreach strategies. Builds interest and organises events. Encourages citizen feedback.
Communication & Storytelling	Shares stories of coordination and mediation. Promotes CCI capacity in sustainability. Documents implementation and creative process. Shares results in networks and with the public.	Tells impactful narratives on chosen topics via different art forms. Communicates through engagement and raising awareness. Documents their own creative process.	Tells story of process and capacity-building. Harvests learning to support dissemination. Documents implementation and creative process. Shares results in networks and with the public.
Outputs & Impact	Strategic alignment with city goals. Greater CCI visibility. Community empowerment. Use of toolkits, open calls, and creative procurements in development processes across departments.	Creative pilots, exhibitions, games, community art, installations, and artworks as behavioural change tools. Strengthened connections between CCI and community. Strengthened sense of belonging via community art engagement of citizens.	Toolkits, capacity-building frameworks. Enhanced support models for CCIs. Insights for scaling and replication.
Sustainability Focus	Embeds pilots into city sustainability strategies; long-term engagement.	Drives behavioural change through creativity by designing and taking energy-related content into action.	Facilitates learning and continuity through toolkits and guidelines.

The identified key capacities of the local authority, artist, and intermediary are derived from each party's ability to fulfil the roles outlined in the collaboration grid, which presents functions of a purposeful collaboration in the CCI4Change framework. While these functions are not the focus of investigation in this study, they serve as a foundation for further examining the key capacities each party contributes towards achieving a successful and efficient collaboration aimed at a shared goal.

5.1. Contributions of the local authority

What does the local authority need to drive an innovative collaboration with artists? The artistic products, skills, and knowledge are often unfamiliar (if not foreign) in the organisational domain (Schnugg, 2014). The study indicates that the local authority requires specific capacities to enable innovative forms of collaboration. According to our findings, these capacities can be grouped into three categories: 1) individual motivation, 2) social skills, and 3) the ability to contextualise the work *(valorisation)*.

The individual motivation of the local authority to work with artists is pivotal. This intrinsic motivation paves the ground for collaboration and all efforts needed to advocate and legitimise its value. This entails an interest and curiosity in artistic work and the benefits from gained expertise related to the role of the arts in citizen engagement, sustainability, and innovation.

Social skills and capacities are indispensable for building meaningful collaborations—firstly, with an intermediary party; secondly, in a cross-sectoral manner within the local authority organisation's diverse departments; and thirdly, in external engagement with the artists and other actors to expand the range of stakeholders and the impact of the collaboration. The local authority needs to integrate the collaboration into other relevant contexts and strategies of governance and build credibility for the artistic activities. In this way, the local authority needs motivation and the skills to support the impact of the collaboration. In other words, the local authority valorises the collaboration with its authority by contextualising the artistic work in a way that creates meaning. The value of the collaboration is created through the local authority's abilities to recognise the meaning and communicate it.

As a prerequisite, the study suggests that an existing and established relationship between the local authority and its creative community provides fertile ground for initiating innovative models of collaboration. A lack of dialogue or existing communication platforms between the local authorities and the creative community can be foreseen as an obstacle for initiation of an innovative collaboration. The collaboration builds on trust between the parties, which is built through continuous exchange and dialogue between the local authorities and the artists.

The obstacles to the collaboration are connected to the prerequisites. The collaboration is cross-sectoral, not only through the involvement of the intermediary and the artist, but also due to its overarching theme (energy consumption), which intersects with multiple departments within the local authority's organisation. The collaboration between diverse local authority departments is crucial. In all five case studies, the collaboration was driven by the cultural departments. But when the collaboration proceeded, it became closely related to other departments such as strategic planning, urban development, and climate action. Also, departments such as technical infrastructure, education, and communications were involved. The role of the local authority officer responsible for the collaboration as a manager and developer of the cross-departmental connections is vital to enable shared ownership between the departments and potential impacts beyond the ones limited only to the cultural department. Another prerequisite considers the readiness of the local authority for creative explorations and innovative approaches. In corporate settings of artistic interventions, the top managers can significantly influence success by actively legitimising the time employees dedicate to engaging with the arts and reinforcing their importance of the actions for the organisation (Berthoin Antal et al., 2019). The case studies indicate this need of management endorsement to support the

legitimation of the artistic actions inside the local authority organisation and, more widely, to raise awareness and promote sustainability and transformation through culture.

One observed obstacle for the collaboration relates to the theme of the collaboration: energy consumption behavioural change of the citizens. At the time of the case studies, there was a lack of clarity regarding the overall responsibility of the local authority in facilitating this change. This uncertainty results in insufficient strategic support to validate the relevance of the collaboration. Since the local authority's role in addressing this issue remains largely unclear, the importance of exploring new means of working toward this goal may be overlooked. This increases the risk for the collaboration to lack strategic backing and remains an experimental curiosity. This finding can serve as a suggestion for the local authorities to use exploratory artistic collaborations to work with goals and topics, in which the local authority responsibility is clear and well-defined.

5.2. Contributions of the artist

As with artistic interventions in organisations (Berthoin Antal, 2012; Lehikoinen, 2013), successful collaboration demands a high level of expertise and capacity in the participating artists. The artist creates the content that drives citizen engagement and designs a process with the potential for the desired change, making the artist's contributions to the collaboration fundamentally relevant.

The artists in the case studies exhibited a large set of capacities that are grouped into four categories: (1) strong professional artistic expertise and practice; (2) motivation to work in a goal-oriented way; (3) capacity to align with collaboration goals while maintaining artistic integrity; and (4) the ability to apply creative methods with communities and create outreach.

The strong professional artistic practice was highly relevant, providing the basis from which to align with the specific framework and goals of the collaboration provided by the local authority. The high level of professionalism led to a winning stance when competing for a collaboration, resulting in winning the open call with one’s tender or proposal.

The artists demonstrated a clear motivation to engage with broader societal and ecological issues, aspiring to generate positive sustainability impacts. Collaborating with local authorities on these issues was seen as highly motivating for the artists, and a shared understanding between the local authority and the artists—that contributing to sustainability through one's work is meaningful—provided a common ground for the collaboration, free of discord. The artistic and creative professional skills are the core competence and contribution that artists bring to the collaboration. However, the capability to comprehend the motivations and needs of the local authority is essential, as it requires contextual skills such as stakeholder awareness and an interest in exploring the relationship between the arts and society (Lehikoinen, 2013; Lehikoinen & Siljamäki, 2023). Also, the skill to adequately adjust to the collaboration and the working culture of the local authority was needed to enable the collaboration.

Citizen participation and the evolving role of citizens in public sector innovations are widely discussed (Agger & Hedensted Lund, 2017). The artists adapted their artistic methodologies to align with collaboration goals, such as community engagement and

energy consumption. As professionals in creativity, artists may also possess the skills and tools necessary for citizen engagement (Warren & Jones, 2015), which was evident in the case studies. The artists showed no struggle in creating meaningful engagements with the community and working with the energy consumption theme through their artistic methodologies. However, amplifying the potential impact of the creative work lies with the local authority, supported by the intermediary, in recognising the significance of the artistic contribution and how it can generate further influence. This also presents the potential risk that the local authority and intermediary may lack the necessary skills or resources to seize the opportunity to develop the impact of the artistic work, apply the approaches and solutions it offers, and further promote its findings.

A prerequisite for the collaboration is the artist's sufficient organisational structure (e.g. operating as a company, foundation, or association) and a proven track record of previous projects and initiatives. This relates to the artist's ability to produce and market their own work, which is a common requirement for sustaining a professional artistic practice.

The obstacles encountered were related to the conditions of the collaboration regarding its timespan and financial resources. While the local authority prioritised citizen engagement, a longer collaboration would enable the artists to foster deeper engagements with the communities. Community engagement takes time. Also, financial constraints posed obstacles. The artists indicated that with greater financial resources, the activities could be expanded to create more impact. Limited financial resources pose a potential risk that the goals of the local authority (energy consumption behavioural change through citizen engagement) are not truly met but only addressed in a superficial manner.

5.3. Contributions of the intermediary

The capacities of the local authority are closely intertwined with the intermediary. As with artistic interventions in corporate settings, the role of the intermediary is also indispensable collaborations between the local authority and the artist (Sandberg, 2016). The case studies provide clear evidence, as corroborated by both local authorities and artists, that strengthing intermediary capacities is essential for fostering purposeful and productive collaboration. The case studies also demonstrate that the intermediary is not necessarily an organisation or a single person, but rather it is a function that must be fulfilled.

The intermediary capacities as contributions are grouped into five categories: (1) Intrinsic understanding of the creative field; (2) Motivation and expertise in artistic cross-collaborations; (3) Knowledge about the local authority context; (4) Skills to facilitate the collaboration; and (5) Ability to support the artististic process.

Aligned with studies of intermediaries in the corporate organisational context (Berthoin Antal, 2012; Grzelec & Prata, 2013), the intermediaries need to be knowledgeable and credible in both domains: the world of art and local authorities. The case studies indicate that the capacity to serve this function stems from inherent expertise in the creative sector, which relates to the identified prerequisites for the work. The intermediary needs to have access to the CCI community (or knowledge of how to arrange the necessary access) and the ability to reach the artists relevant for the collaboration. The study shows that the collaboration provides a meaningful and inspiring context for the artist's work. This needs to be understood in contrast to the more traditional assignments where the

artists need to independently construct or reinforce a contextual framework for their work. Without such a framework—a bridge to the surrounding world and society—the artwork may be isolated and lack dialogue, engagement, and broader societal relevance. The intermediary plays a pivotal role in building this context of relevance and dialogue, translating and expanding it from the local authority to the artistic one, ensuring the appeal of the collaboration and that the mission of the work can be well understood by the artists.

As a prerequisite for the collaboration, the intermediary has expertise in artistic work in cross-collaborative settings, and with this experience, provides relevant support for the process. The artist and the local authority may initially collaborate in this kind of set-up, but the expertise of cross-collaborations of the intermediary provides needed support for the process. The intermediary understands the local authority priorities, constraints, and working processes, as well as supports the artist in a sensitive yet goal-oriented manner, recognising their precarious position and the essential nature of artistic freedom. The capacity to apply the 'arm's-length principle' while also providing clarity and guidance to help artists align with the goals of the collaboration.

With the combination of essential capacities, the intermediary facilitates the collaboration and takes into consideration the require the needed agreements and negotiations for securing fair work for both parties. The intermediary is able to facilitate discussions about the goals and expectations for the collaboration. The case studies showed that artistic freedom is a strongly emphasised core value of the collaboration, acknowledged and respected by all parties and brought into discussion by the intermediaries.

There were three acknowledged obstacles in the collaboration. Firstly, obstacles occurred when the intermediary was not capable of fulfilling the function with the needed requirements. This resulted in an unclear division of roles and responsibilities between the intermediary and the local authority, leading to ambiguity and not contributing to a productive collaboration. Secondly, obstacles occured when the intermediary was too distant from the actual collaboration of the local authority and artist, leading to expanded responsibilities for the local authority.

5.4. Summary

The research examined the key capacities required to foster purposeful collaboration by outlining the capacities of each stakeholder—local authorities, artists and intermediaries—while identifying prerequisites and obstacles for the collaboration.

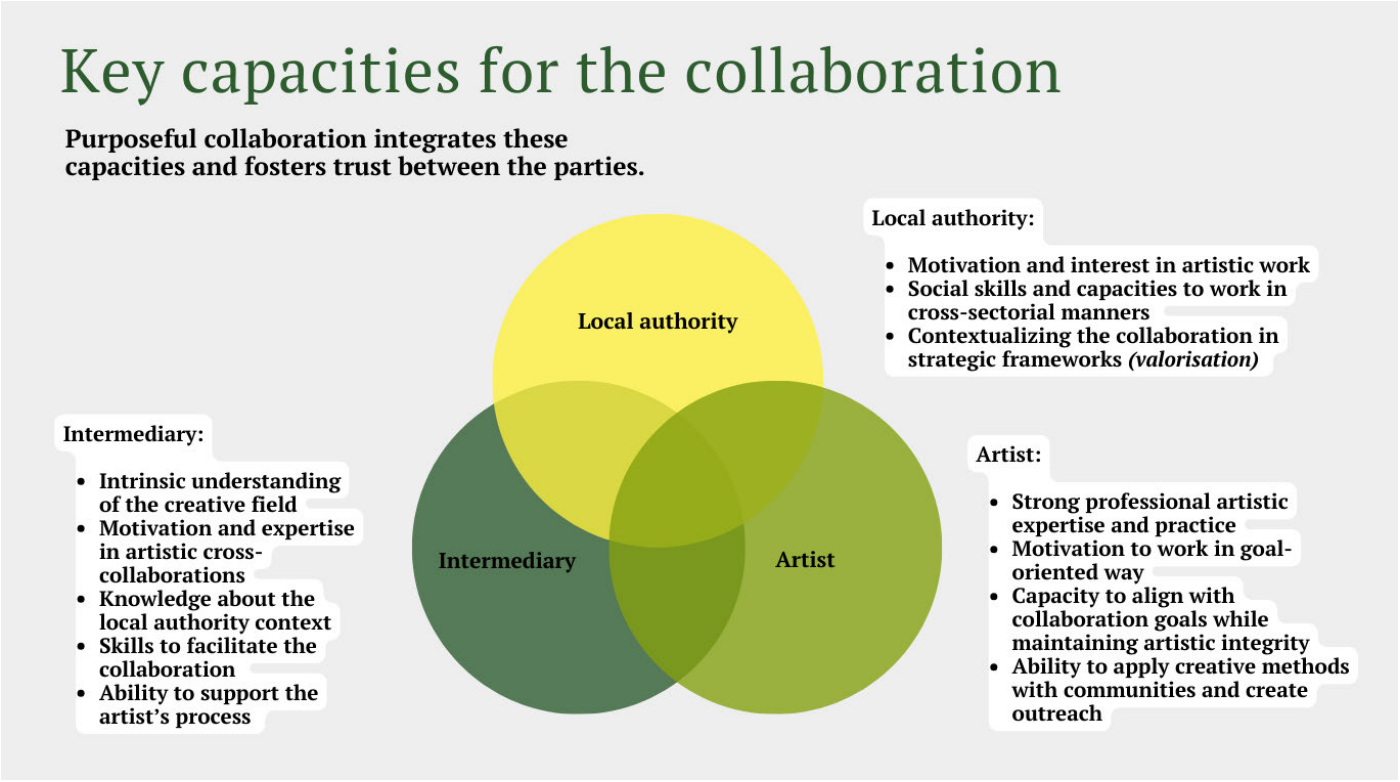

Figure 5. Capacities for the collaboration.

The capacities of the three key actors in the collaboration model relate to motivations to explore artistic cross-sectorial collaborations and work towards sustainability. The local authority plays a pivotal role driving the collaboration and managing its cross-sectoral nature and opportunities within the organisation to enhance its relevance. The capacities of the artists relate to their strong artistic practice and motivation to adjust the practice to the collaboration goals. The intermediary has the expertise and credibility to serve as a bridge builder, understanding the motivations of both parties and supporting the artist's work within the collaboration framework.

The identified prerequisites for collaboration are related to organisational capacities of the parties and access to the CCI communities. As the case studies illustrate, the high quality of professional artistic skills is fundamental for an efficient collaboration, and access to relevant creative communities is vital to ensure the collaboration engages artists with the necessary capacities for the collaboration. The capacity of cross-sectorial collaborations within the local authority organisation is a prerequisite supporting the efficiency of the collaboration.

The obstacles to the collaboration stemmed from difficulties in identifying supportive strategies and policies to underpin the work. The case studies employed a three-party collaboration model, but unclear roles and responsibilities among the participants hindered efficiency. While the artists themselves did not encounter significant barriers, they noted that increased time and financial resources could enhance the effectiveness of achieving the collaboration's goals.

6. Analyses

The study indicates that trust plays a pivotal role in fostering purposeful collaboration. In the case studies, the artists were granted full autonomy and confidence in their ability to produce high-quality artistic content while simultaneously meeting the goals set by the local authority. In turn, both the local authority and the intermediary were committed to respecting and encouraging artistic freedom and expression. The arm's-length principle was recognised by all involved parties as a fundamental prerequisite for establishing a trustworthy and inspiring collaboration. For local authorities aiming to integrate innovative collaborations with artists, the setup must not only consider artistic freedom but embrace it as a source for potential change, innovation, and impact. Supporting the building of trust can be considered a primary objective of the intermediary's role in the collaboration.

The value of the collaboration to all parties is clearly demonstrated in the case studies, and the collaboration seen as essential and inspiring. To enhance the ability of local authorities to foster collaborations with artists working towards sustainability, it is essential to recognise the capacities involved and address potential obstacles. Ensuring that these collaborations are purposeful and suitable for integration into local authority operational systems requires deliberate support and strategic planning. Further investigation is needed into how the creative outputs, processes, artworks, and approaches developed by artists can be supported, and how their value can be better understood and expanded. Additionally, the relevance, impact, and value of collaborations between local authorities, artists, and intermediaries in the context of sustainability need deeper exploration and research.

As this study concludes, the co-creation process of the CCI4Change collaboration model remains ongoing, and additional data may contribute to future research. This study did not focus on the usability or impact of the CCI4Change collaboration model, and therefore, this limitation does not pose a concern.

7. Conclusion

This study focused on identifying the roles, characteristics, capabilities, and connections of three entities: local authorities, artists, and intermediaries. This study employed a qualitative approach with a limited number of case studies. While the findings are not broadly generalisable, they provide valuable insights and transferability to similar initiatives and offer valid considerations for fostering purposeful collaboration between local authorities and artists with the support of intermediary parties. This knowledge supports the application of the CCI4Change collaboration model, as well as other similar models, aimed at facilitating a more systemic implementation of local authority-driven collaborations to enhance sustainability in communities, together with artists and creatives.

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UNLOCKING CO-DESIGN
for public design approaches

COLLABORATION - PARTICIPATION - CO-CREATION - METHODS - COMMON - EMPOWERMENT

INTRODUCTION

Coming from syndicalist movements striving to transform firms in 1960s Scandinavia, **collaborative design (or co-design)**, is now everywhere in creation, where it seems to fully blend in a globally praised participative conception culture. But co-design indeed appears to be trivialised to such an extent that it might be now difficult to distinguish it from any participative approach (co-conception, co-creation), or even any approach in the spectrum of workshop facilitation.

More specifically, co-design is an approach to a design project seeking to **"involve users from the beginning of a project to its end"**, as explained by Loélia Rapin, PhD candidate at Nantes Université, Sensipode, and L'École de design Nantes Atlantique.

So if a co-creation workshop or a UX research process integrates users at some point, at some degree, through some methods, it must still be differentiated from a co-design approach that will manage to involve user throughout the whole design process.

This being said, how should a design team manage users involvement in such a long and technical process ?

METHODOLOGY

In order to comprehend the impact of users involvement in a public design approach, students went through several research steps.

Interviews with 3 designers

- **Swanny SERRAND** - Public service designer, Rennes métropole - 60'
- **Rémy TESSEYDRE** - Service designer; Landscape project & citizen participation PhD, État'LIN- 45'
- **Loélia RAPIN** - PhD candidate, Nantes Université, Sensipode, L'École de design Nantes Atlantique - 60'

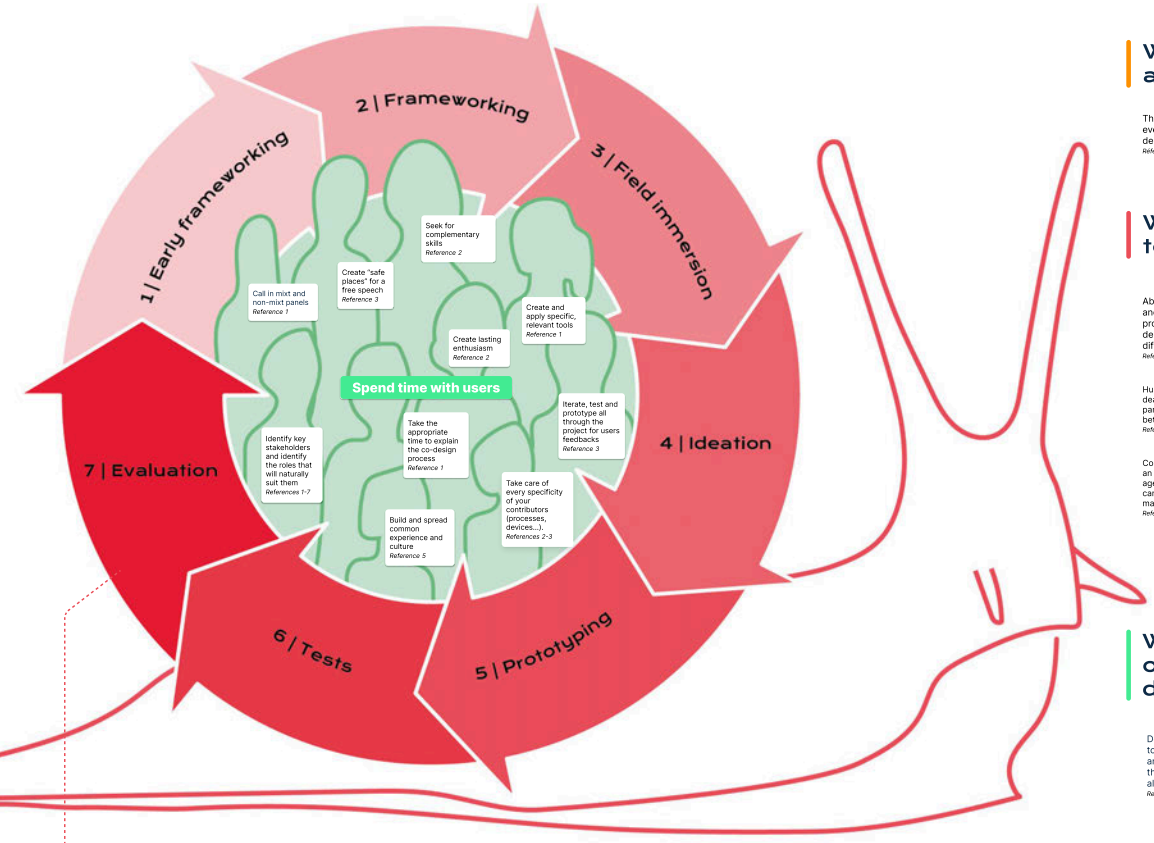
Topics of the interviews :

- Defining co-design
- Successful projects criteria
- Good practices to drive a co-design project
- Obstacles to a co-design project
- Limits in co-design projects
- Designer's part in a co-design project

Analysis process

- Interviews and literature retranscription
- Culstering by categories : obstacles, clichés and good practices
- Reformulation of statements and stakes
- Compiling good practices in a design project timeline

Co-design is like a snail...



What are the clichés to contradict about co-design ?

- Thanks to co-design, everybody can be a designer *Reference 1*
- Co-design is universally applicable *Reference 7*
- Co-design equals concertation *Reference 2*
- Tout le monde peut participer de manière égale *Reference 7*

What are the common obstacles to an efficient co-design process ?

- Absence of experience and skills on the specific project makes the decision-making more difficult. *Reference 1*
- It is delicate to feel when distance must be taken with users' feedbacks. *Reference 1*
- Multiplicity of actors makes the project hard to manoeuvre. *Reference 2*
- It is complex to both manage a project, and let it be managed by other actors. *Reference 3*
- Human factors must be dealt with : sceptical participants, disagreements between stakeholders... *Reference 1*
- Any human-related unplanned event will have a big impact *Reference 3*
- A workshop might not fit the targeted users *Reference 1*
- The result will always be uncertain : co-design will remain difficult to promote *Reference 8*
- Co-design might be used as an alibi to quietly impose an agenda : designers must be careful with possible manipulation *Reference 3*
- Users expectations towards co-design must be spelled out *Reference 7*
- Sharing a good and consistant level of information requires special care *References 6-7*
- The reason for users to take time to participate is often unclear *Reference 1*

What is actually the role of a designer when design is collaborative ?

- Designer knows how to deal with dissent and consensus (even though setbacks may always happen) *Reference 3*
- Designer has to play a function of pedagogue, diplomat, or intermediary. *References 2-6*
- Le designer doit adapter son langage et vulgariser son propos *Reference 2*
- Designer will clarify every term - and call a spade a spade *Reference 3*

7 steps for a co-design project

1. Early frameworking

Good practices :
- Identify the project's goals, pick a first set of methods as appropriate as possible. *Reference 7*

Obstacles :
- Co-conception projects must be frameworked with very few marks. *Reference 2*
- Lack of time. *Reference 2*
- Lack of funding (both for methods and for the result...). *References 7-2*
- Hierarchical and administrative inflexibility. *Reference 1*
- A method can come with its own set of constraints. *Reference 1*

2. Frameworking

Good practices :
- The actual level of participation to the final decision must be clear and precise (explanatory charter). *Reference 1*

"We're asked to participate only to sweeten the pill" *Reference 1*

- Involve users from the very start. *Reference 1*
- Plan users sollicitation. *Reference 7*
- Define together the study framework, the right stakeholders, and the good practices. *Reference 1*

"Bring people together, provoke opportunities" *Reference 1*

Obstacles :
- Hard to convince and mobilize stakeholders. *Reference 2*

3. Field immersion

Good practices :
- Adapt methods to the field and its global context. *Reference 1*

"Adapted tools are necessary for people to share an opinion with all the necessary information" *Reference 1*

- Keep close to your users. *Reference 1*

"Organize quality time with the different professions and with users" *Reference 1*

Obstacles :
- Failing to mobilise important users. *References 2-4*

Clichés :
- Users always know what they want. *Reference 7*

4. Ideation

Good practices :
- Boost creativity with appropriate exercises and general organization. *Reference 1*

"One of the limits with collaborative workshops is the injunction to make a lot of them. I sometimes thought that it was the wrong format with the tools and target I had then". *Reference 1*

Obstacles :
Dealing with constraints (technical, financial, legal) in the same time participants develop ideas. *Reference 7*

Clichés :
- "Users ideas are always the best". *Reference 1*
- "Anybody can conceive". *Reference 1*

5. Prototyping

Good practices :
- Ease communication with the designer's visual skills. *Reference 1*

"When we were making tests, people would better project into the future, they would involve more and would share more insight" *Reference 1*

- Test pragmatic solutions :
  - reassuring
  - involving
  - projecting
  - modify

Reference 1

"We test very pragmatic prototypes ; they are reassuring for participants and they make projection easier" *Reference 1*

7. Evaluation

Good practices :
- Evaluate and compare impacts expectations versus reality. *Reference 1*
- Share results with users. *Reference 7*

"Show involved users that the time spent sharing experiences through co-design is valuable" *Reference 1*

Obstacles :
- Resistance to change. *Reference 7*
- Disappointment with project's outcome.
  - not meeting expectation
  - not fitting with the field

  Reference 7
- Lack of analysis time and follow-up time. *Reference 7*

Clichés :
- "Co-design costs are always absorbed" *Reference 7*

... it takes its time !

Co-design is a global collaborative project approach, integrating users to every steps of the design process thanks a wide set of methods. It is based on experience sharing, careful attention and collective intelligence. Beyond these empowering methods, **co-design allows project teams to elaborate solutions answering precisely to actual needs**. Co-design will induce a slower attitude, guaranteeing a better understanding of users' needs. It will also give the opportunity to experiment deeper trust between different stakeholders, who will discover together iterative processes and uncertainty in projects.

In co-design, designers add to their conception and coordination skills, **a key role in project mediation**. They adapt tools and methods initially inteded to be used by designers, so each participant contribute in an appropriate manner, according to his/her abilities and needs. Designers will have to slowly and constantly propose **adaptations in methods, tools and solutions** to be validated by the collective that is gathered to realize the project.

So even though co-design has the potential to deal with complex projects, it is important to remind that a radical and global co-design positioning does not suit every project, or planning, or territory. A co-design approach must be launched when a project team believes that **efficiency does not necessarily come with rapidity**, and when everyone is about to accept to share some power with a group - in **exchange for key insights, true use of experience knowledge and renewed team commitment**.

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1- Swanny SERRAND - Public service designer, Rennes métropole - 60'
2- Rémy TESSEYDRE - Service designer; Landscape project & citizen participation PhD, État'LIN- 45'
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CONFERENCE
11- Simon HOURIEZ (12/11/24) Design de politiques publiques et inclusion : la bonne paire - 90min

Research workshop led by Simon Boussard - Line Lorre - Clara Tortorici
Poster created by Benjamin Bey, Pacome Bonnet, Elise Ferrard, Morgann Le Berre, Célia Rouger, Claire Tesson
Correction : Simon Boussard - Sensipode

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MAPPING ETHICAL PREFERENCES IN SMART TECHNOLOGY: THE MORAL DATA CITY HUNT APPROACH

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ABSTRACT | Municipalities' growing interest in Smart Cities drives technological interventions that enhance logistical, energy, and spatial processes while impacting social and cultural structures. Creating moral smart cities requires according to Wernaart the active involvement of concerned parties at the design table. Or as DiSalvo noted, "Designing becomes a way to care, together, for our collective futures."

The Moral Smart City project seeks to develop a strategy for fostering continuous citizen engagement in decision-making regarding emerging technologies within the city, utilising the Moral Data City Hunt (MDCH) method. This method, developed by the Moral Design Strategy research group at Fontys University of Applied Sciences, combines empirical ethics, linguistic analysis, and comparative social science. A key component is design fiction, which is applied in a "mobile moral lab" to highlight future technology applications and the associated moral dilemmas. Residents interact with this lab, influencing the moral settings. These interactions help map the ethical preferences of different resident groups, contributing to a dynamic, techno-moral urban compass.

This article aims to provide the rationale for addressing 'value friction' in moral technological dilemmas for local governments within a pluralistic democratic rule of law, and describes the methodological design choices involved. By mapping friction, the MDCH gathers insights into pluralistic values in society, and the feedback loop helps facilitate the urban transition from citizens' often limited understandings and abstract perceptions of emerging technologies to a collaborative process of co-design and inclusive discussions. The pilot study of this Moral Data City Hunt method was launched in several Dutch municipalities as of May 2025.

KEYWORDS | #SMART CITIES, #MORAL DATA, #DESIGN FICTION, #CARE ETHICS, #PUBLIC ENGAGEMENT, #DESIGN FOR POLICY

1. Introduction

The 'smart city' is rising; municipalities increasingly use 'smart' technologies to streamline public infrastructures, make processes more efficient, and tackle complex challenges in public spaces and services. Although cities may implement these technologies with laudable goals in mind, technology is not necessarily a neutral tool toward these ends; technologies affect the city in foreseen and unexpected ways (Veen & Visser-Knijff, 2022).

Changing moralities bring possibilities for new technologies. New technologies, in turn, can modify societies (Wernaart, 2021, p. 14). Products and services based on algorithms, artificial intelligence, and robotics may severely impact public values. Cameras - whether in a smart doorbell, crowd control, or a scanning car - may affect the freedom to assemble, express one's opinion, and move freely without being tracked.

Since innovative city technologies can lead to objectionable and unwelcome effects, local governments have a responsibility to reflect on the societal impact and ethics of these technologies. Next to municipality officials creating 'moral smart cities' requires the active involvement of other parties (Wernaart, 2022). Therefore, this working paper outlines the theoretical foundations for developing the Moral Data City Hunt (MDCH): a research design that gathers the relevant stakeholders and perspectives necessary for reflecting on the potential impact of smart city technologies while providing these actors with accessible tools and scenarios to assist inclusive decision-making.

This paper aims to position the MDCH method within other 'design for research' methodologies and identify its novel methodological contributions. It argues that one of the MDCH's main contributions is its application of 'value friction' in social design and ethical research. The paper also states that gathering insights into the pluralistic values of citizens helps local governments govern smart ánd caring cities.

Although the Fontys University of Applied Science Moral Design Research group developed and deployed the method in 2022 (Veen, van & Wernaart, 2022; Wernaart et al., 2022), the interdisciplinary method based on empirical ethics, design fiction, linguistic analysis, and comparative social science had not previously been underpinned by scientific theory. In addition, the method itself is a design, but it has not yet been explained from that perspective.

The paper first addresses, in section 2, the MDCH's rationale and theoretical foundation. Section 3 of this article, 'Design for research', explains the design approach and describes the implementation and specifics of the MDCH.

2. Rationale and theoretical foundation

The rationale of the Moral Data City Hunt is that researchers traverse through the city to engage with as many citizens as possible by inviting them into a moral lab. This is an environment where the audience is shown what new technologies could mean for the future of a city, can interact with this vision, and decide on the moral implications of that future technology. By employing empirical ethics and conducting open interviews with language analyses, it is possible to identify the social friction inherent in the use of new technology. This valuable input enables policymakers and companies to develop a clear strategy for addressing this new technology. The Moral Data City Hunt is thus about future thinking, citizen engagement, and applying ethics to emerging smart technologies. This

section connects this rationale to existing literature and previous research of the research group Moral Design Strategy, and applies these insights to the research design of the MDCH.

2.1 Smart Cities Futures

Many local governments are aware of the transformative power of new technologies yet remain uncertain about how to respond to potential unforeseen effects (Veen & Visser-Knijff, 2022, p. 150; Yigitcanlar et al., 2021). New technologies often promise explicitly positive futures. These powerful and upbeat promises may obstruct critical reflections on the consequences of these scenarios (Lilley et al., 2004; Andersson, 2022). Additionally, thinking about the future can be somewhat tricky. People easily get caught in extreme future visions where one scenario "appears to be unthinkably bad, the other unimaginably good" (Candy, 2010, p. 1). Additionally, it appears to be challenging for many to consider the long-term future implications (Meadows et al., 1972).

The future is the domain of ideation and imagination (Candy & Kornet, 2019), and it is important to allow for various perspectives, not just two extreme visions. Imagining various possible futures provides space for dialogues on desirable futures. It creates room to talk about which worlds we do and do not want and opens up the moral conversation about the role of technology in society.

However, to access those potential futures, we need specific skills. Ahvenharju and colleagues (2018, 2021; Lalot et al., 2021) describe 'future consciousness' as "the human ability to understand, anticipate, prepare for, and embrace the future." Employing the concept of future consciousness helps us recognize the interconnections between technology and our surroundings. Future consciousness expands our imagination in time and space, enabling us to care for others. According to futurists, future consciousness skills are a prerequisite for good decision-making, which is important for the MDCH method (Masini, 1993; Polak & Boulding, 1973). Equally significant, awareness of future consequences can increase civic engagement (Bruderer Enzler, 2015; Strathman & Joireman, 2005).

2.2 The Moral Authority

Civic engagement in smart city decision-making is not self-evident. Van Veen and Visser-Knijff (2022) claim that the public debate about technology and its possible consequences is often vague and that only a handful of people are in a position to engage with it. Wernaart (2022) further questions this lack of inclusivity by introducing the concept of 'moral authority,' into 'Moral Design', which shares similarities with 'design justice.'

Users play a significant role in design and technology research. Users' perspectives are essential for creating products that prospective users will adopt. Additionally, user perspectives help counterbalance the influence of other stakeholders and groups in the development of technologies, such as scientists, engineers, politicians, and financiers (Wyatt, 2003, p. 69). However, not everyone who gets exposed to technology is a user. Wyatt (2003) introduces the non-user as an actor who, by choice or necessity, does not use a specific technology yet is still affected by it. Oftentimes, non-users belong to 'the moral authority.' They are actors who experience the effects of a particular technology firsthand (Millar et al., 2017; Wernaart, 2022). The notion of 'moral authority' aligns with the 'design justice' concept. According to Carl DiSalvo (2022, p. 4), "design justice privileges those who are most affected by the products of design" instead of "placing the agency of invention and action in the hands of designers." In line with these ideas, Wernaart (2022)

argues that 'the moral authority' should be invited to the design table. Following this claim, the MDCH aims to assist design and designers in bringing the views and experiences of the moral authority to the forefront.

2.3 Value Friction & Empirical Ethics

In their decision-making, humans switch between various ethical frameworks, and groups of humans may carry different sets of key values (Aliman & Kester, 2019). Importantly, cities are pluralistic societies; their inhabitants hold diverse opinions based on various lifestyles and differing values. In democracies, not only do the views of the majority count, but also the voices of minorities and marginalised groups. Smart city technologies are increasingly utilising AI and automated systems. It is difficult for automated systems to account for complexity. These systems are often programmed to make choices based on consequentialist ethical structure and specific sets of values. AI can also learn from data, find patterns, and develop "new rules"; yet, this is based on the rules it was programmed with. Unlike humans, who can abstract and apply concepts to unfamiliar data, AI strictly follows its programmed rules, potentially leading to harmful outcomes (Aliman & Kester, 2019; Gros et al., 2025)

For effective governance, designing AI and smart technologies that focus on human morality is essential, ensuring they can adapt to societal values and mitigate risks (Heijnen et al., 2024). Aliman and Kester (2019) address this problem with their work on 'augmented utilitarianism' (AU) and argue that AI systems should reflect society's pluralistic values in decision-making. Although AI systems are currently incapable of such complex decision-making, Aliman and Kester created AU as a framework for future responsible AI. AU adds several ethical frameworks and scientific findings from psychology and other fields to augment consequentialist programming. Ideally, when applied in heuristic models, AU enables researchers to adjust parameters and experiment with various outcomes in ethical decision-making. By doing this, researchers can identify different ethical boundaries for various sets of parameters. These boundaries can then be applied to develop the AU framework further.

Inspired by AU, the MDCH includes multiple perspectives and value sets to locate crucial ethical boundaries in society and do justice to its diverse voices. The MDCH starts by presenting citizens participating in a MDCH session with a specific future scenario. Next, the participants can change certain parameters connected to different values in the scenario to influence the scenario outcomes. By doing this, researchers can map conflicts between the preferred values of various participants. We call these conflicts between the participants' preferred values 'value friction'. It is a central notion in the MDCH because it reflects citizens' potentially conflicting views and interests. This focus on 'value friction' aligns with AU's aim for ethical boundaries. By targeting value friction, the MDCH contrasts with design approaches such as Value Sensitive Design and Design for Social Impact, which take key universal values as a starting point.

By mapping friction, the MDCH gathers insights into pluralistic values in society that help designers, developers, and policymakers make decisions in smart city projects. This way, the MDCH provides a techno-social feedback loop that collects a variety of viewpoints, enabling designers to utilise these viewpoints at various stages of the innovation process. The feedback loop also helps to facilitate the urban transition from citizens' often limited understandings and abstract perceptions of emerging technologies to a collaborative process of co-design and inclusive discussions.

3. Moral Data City Hunt - Design for Research

The Moral Smart City project aims to develop a strategy for continuous citizen

engagement in decision-making about emerging technologies in the city, using the Moral Data City Hunt (MDCH) method (Veen, van & Wernaart, 2022; Wernaart & Arets, 2024; Wernaart et al., 2025; Arets et al., 2025), developed by the research group Moral Design Strategy. It combines empirical ethics, design fiction, linguistic analysis, and comparative social science to study the 'moral design of emerging technology at the same time. Based on previous interdisciplinary literature, the Moral Smart City project aims to intertwine the research design of the MDCH with concepts such as Future Consciousness, Moral Authority, and Value Friction. This research project was launched in May 2025. Here, we outline its research aims and methodology.

The Moral Data City Hunt (MDCH) method was developed hands-on based on insights from the applied research experiences of the Moral Design Strategy research group at Fontys University of Applied Science (Wernaart et al., 2022; Veen, van & Wernaart, 2022) to address key aspects that are often overlooked in other ethical research approaches. The study's structured research design reflects the methodological foundation, shown in Figure 1 - Overview of the Moral Data City Hunt.

Using a Moral Lab, an online or offline environment where the audience can experience a future that shows what new technologies could mean, helps participants stretch their Moral imagination. The MDCH method is inspired by the four stages of individual ethical decision-making of Rest (1986), which are noted in five pink text bars:

- Recognising the moral issue by using a [Bottom-up approach] (see Figure 1),
- Making a moral judgment based on [Agreement and friction] and with the help of [stretching moral imagination],
- Establishing moral intent based on a [heterogeneous group of citizens], and
- Moral acting uses society's value frictions on [techno-ethics in politics] or policymaking.

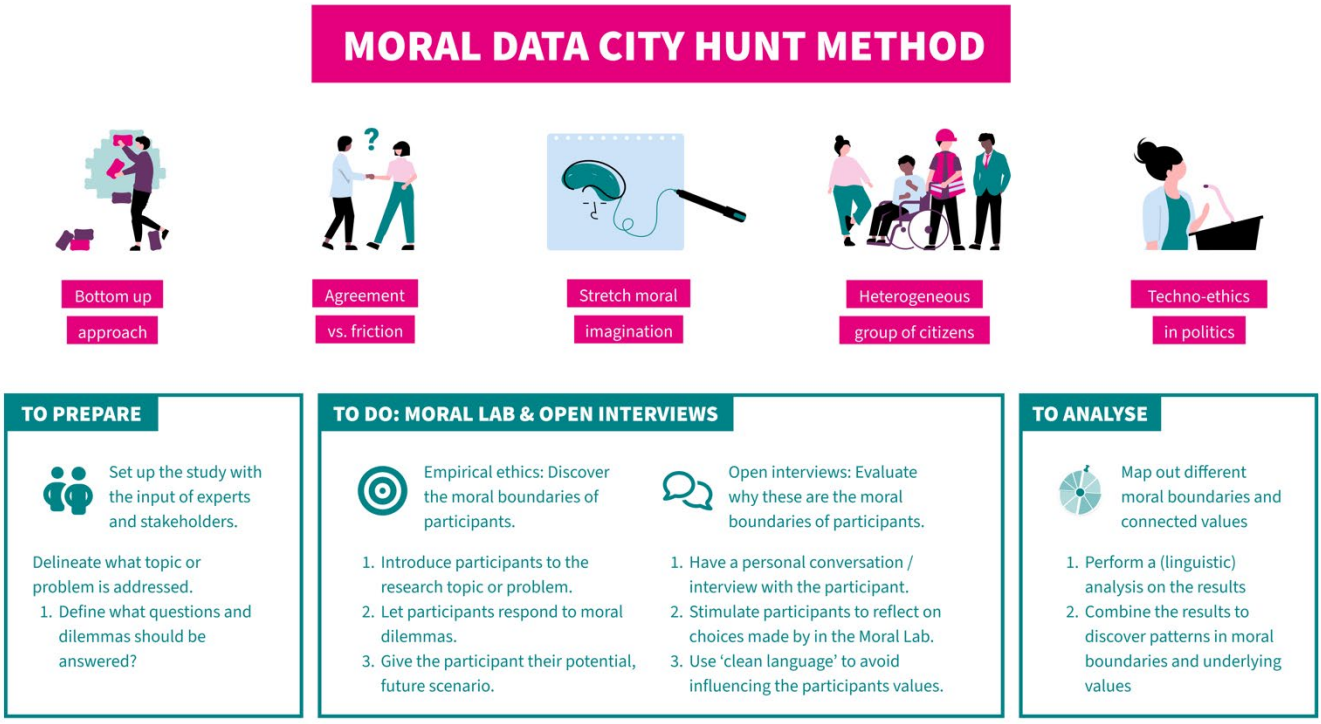

Figure 1. Overview of the Moral Data City Hunt Method. Image: Anika Kok (2024).

The process begins by preparing the research [To Prepare] shown in Figure 1, which involves clarifying the problem and formulating key research questions.

In conducting the research, the box [To Do: Moral Lab & Open interviews] empirical ethics will be done by introducing participants to the research problem, letting them engage with ethical dilemmas, and exploring potential future scenarios based on their choices. In the second part of this box, research participants will reflect on their decisions in personal interviews guided by neutral language to minimise bias. These open interviews will complement research insights on moral decision-making.

Finally, the research data will be analysed [To Analyse] by linguistic analysis of the collected data. A map will be conducted showing the moral boundaries and values, recurring patterns, and ethical considerations across participants. This structured yet flexible approach increases the chances for the MDCH to effectively capture diverse perspectives, foster ethical reflection, and contribute to broader discourses on techno-ethics in society.

3.1 To Prepare the MDCH: case selection and moral dilemma definition

The Moral Data City Hunt starts by preparing research on a particular smart technology within the city. The municipality will choose this technology based on their own needs or understandings, for instance, questions from citizens, an Emerging Issues Analysis (Dator, 2018), a request from the city council, an innovation trajectory, or any other possible origin. The technology can be a new emerging smart technology, such as drone technology. However, it could also be a new application of an already existing technology in the city, such as facial recognition in cameras used in public spaces. If the technology has been chosen, it must get a context within the city, determine how the future might look, and how this technology would probably affect the city's inhabitants.

In the preparation phase of the MDCH method, a hybrid framework for design and futures research, Ethnographic Experiential Futures (EXF), developed by Candy and Kornet (2019), will be used. It is designed for working with individuals or communities and helps examine ‘existing’ or generate 'new’ images of the future. The EXF also helps to make these images more accessible, legible, and discussable via tangible, performative, or other mediation strategies.

The EXF uses four steps for future action research; see Figure 3, The EXF cycle of Kornet and Candy (2019).

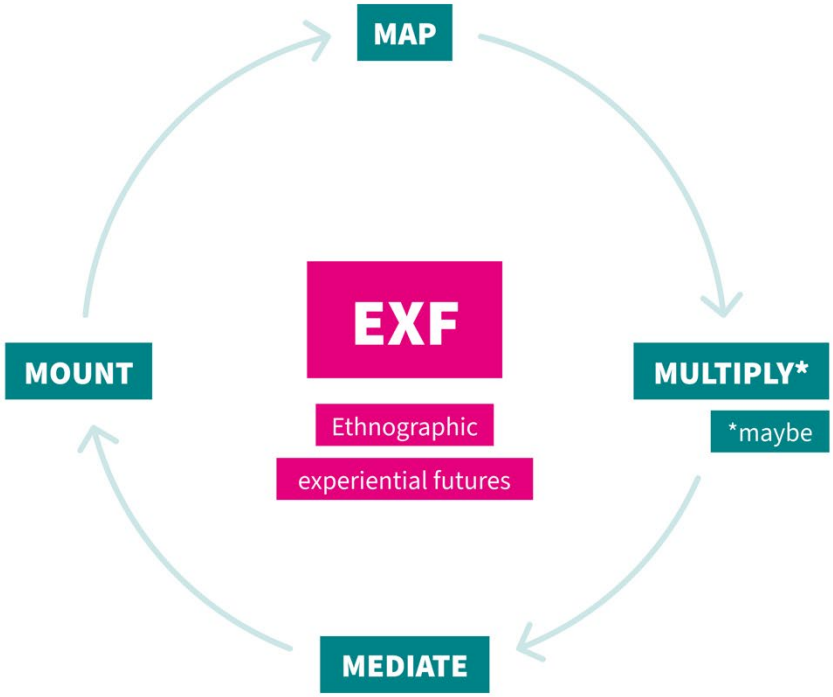

Figure 2. The EXF Cycle, by Kornet and Candy (2019). Image: Anika Kok (2025)

In the MDCH, case selection begins with the first step of EXF [Map] (see Figure 2), which explores the technology, its developments, and the possible influence on the city. The case selection will be based on the existing images and anticipatory assumptions of technological experts and the experts around this technology within the municipality. These individuals will likely be asked for advice when implementing this technology within the city. The aim is to describe the probable future of this technology in the city and explore the opportunities and threats these experts recognise, as well as the moral choices behind these opportunities and threats. This probable future can be perceived as the future that might seem most probable for all stakeholders: citizens, city officials, and various organizations working there. The delivery of this step is a text of the case: the probable future of a particular smart technology and its three most important moral dilemmas.

In the next step [Multiply], the previous assumptions and images will be reframed with alternative futures; in the MDCH, eight different possible perspectives on the future of this smart technology in the city will be created based on two possible choices for each dilemma. See Figure 3.

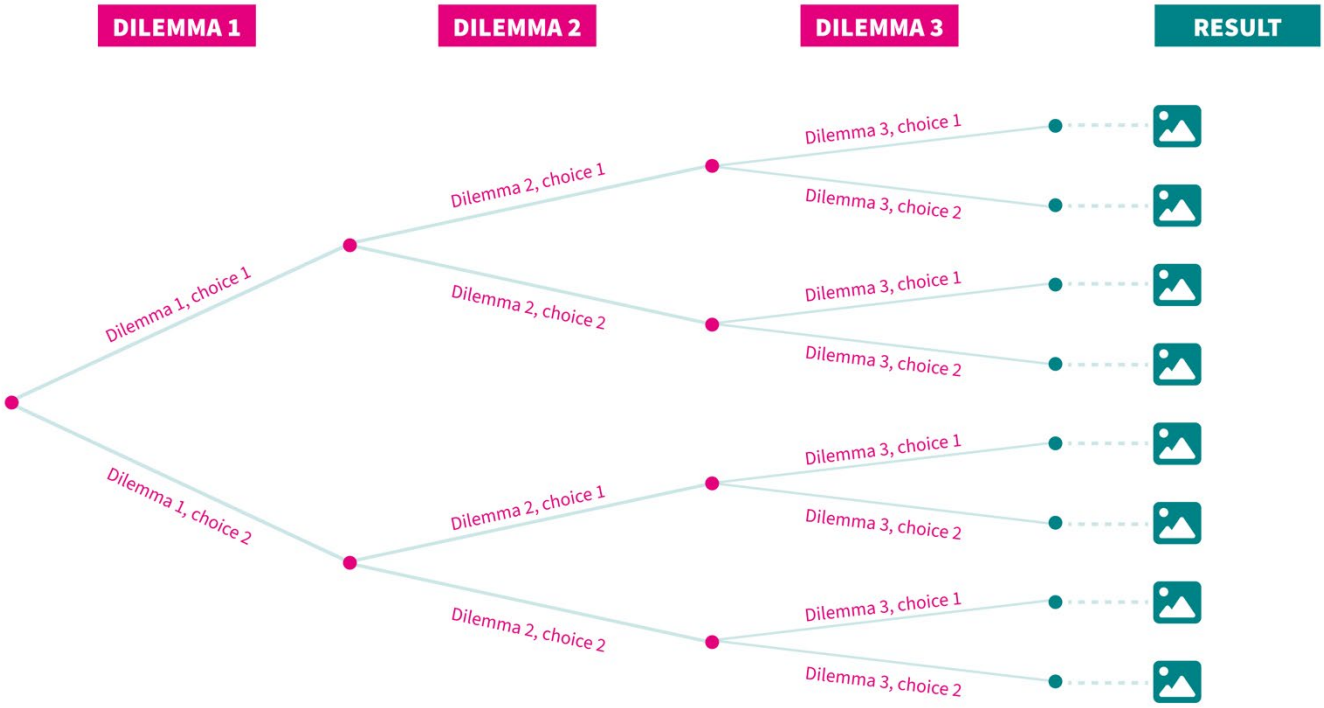

Figure 3. Overview of all the futures needed to create three dilemmas with two possible outcomes. Image: Anika Kok (2025)

In the step [Mediate] in Figure 2, future ideas are translated into experiences: tangible, immersive, visual, or interactive representations. The MDCH case, the probable future, and the moral dilemmas are prepared to make them understandable to a large audience via design fiction. In the research phase of the MDCH, participants will be shown their 'preferred' future based on their moral decisions. All the possibilities of this morally preferred future must be prepared; see Figure 3.

In the research phase [Mount] (Figure 2), empirical ethics will be conducted by introducing participants to the case and the probable future of a particular smart technology. This will allow them to engage with ethical dilemmas and explore their potential future scenarios based on their choices. In personal interviews, the participants will reflect on their presented 'desired' future and Moral Lab decisions.

Then, the circle will be closed by returning to [Map], recording and analysing the responses to create a new vision of the future.

3.2 To Do – inside the moral lab: empirical ethics

During the experiment, participants use an application designed specifically for this study. This application includes a page for informed consent, demographic questions, and the previously discussed ethical dilemmas. Each dilemma is presented using a visual representation of a possible future scenario. The depicted future dynamically adapts based on the participants' choices, allowing them to observe the implications of their decisions in real-time. This interactive feature enables participants to reflect on and potentially revise their choices if the future does not align with their expectations or preferences.

Figure 4 presents the application's current design iteration. Further development and refinement will shape the final design of the first functional version.

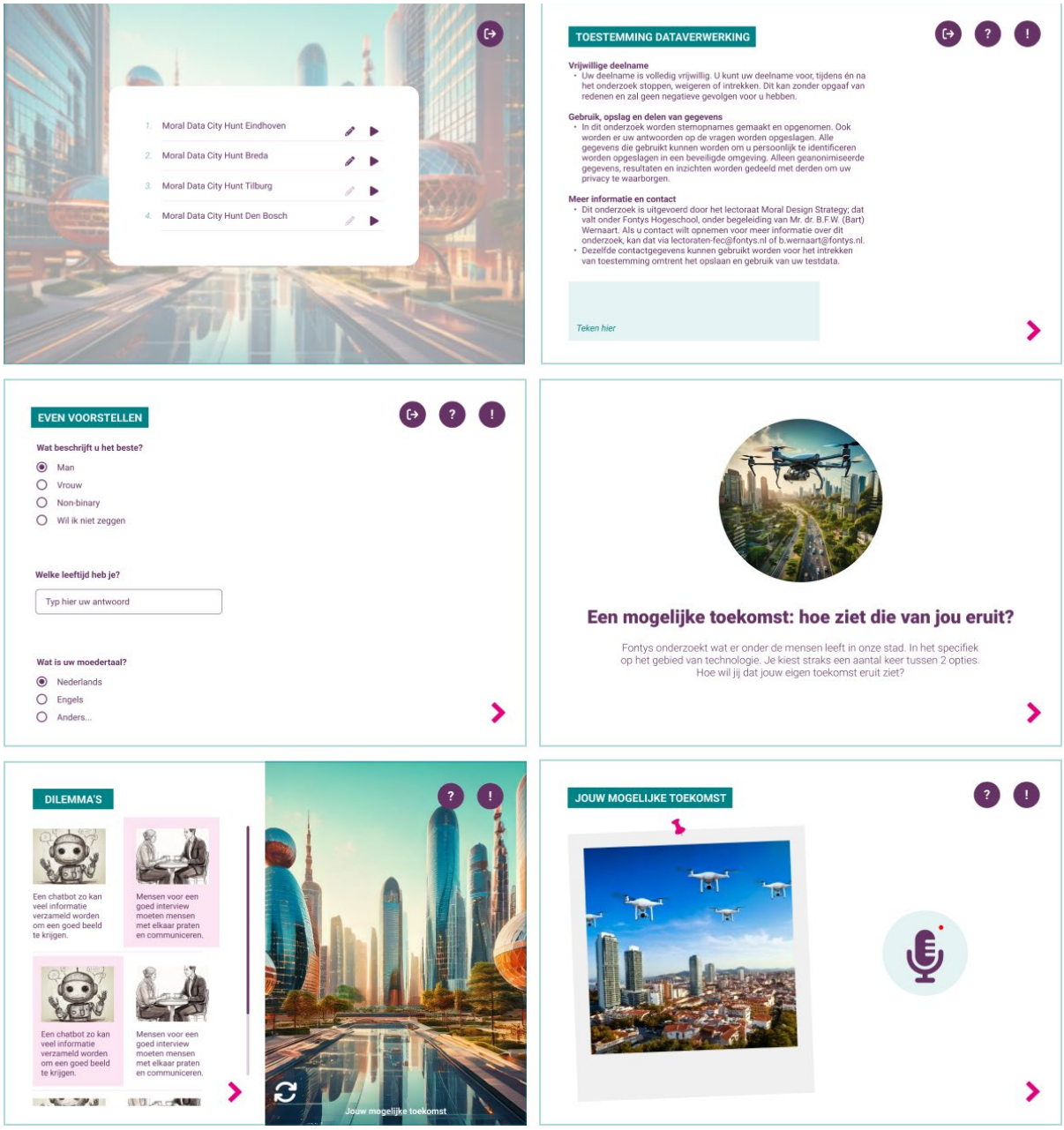

Figure 4. Design iteration of the research - application of the MDCH. Image: Anika Kok (2024).

Open interviews will complement research insights on moral decision-making. Participants will reflect on their Moral Lab decisions in personal interviews, guided by neutral language to minimise bias. After participants reflect on moral dilemmas and shape a visual representation of their preferred future, a short interview will be facilitated to explore their perspectives.

3.3 To Analyse - Mapping Value Frictions

The interviews combine a survey with linguistic analysis. Both methods have limitations: Surveys or focus groups often fail to capture individuals' nuanced gut feelings, while linguistic data mining can lack real-world context. The MDCH approach combines personal engagement with linguistic analysis to understand better which values drive the participants' perceptions.

The linguistic data analysis is rooted in Schwartz's Value Theory, a widely recognised framework for exploring personal values and their interconnections (Schwartz, 2012). Research demonstrates that people's words in natural conversations often reveal their

underlying values more effectively than direct self-reporting (Boyd et al., 2015). The Personal Value Dictionary (Ponizovskiy et al., 2020), a validated tool linking language to Schwartz's value framework, explores these insights. Combining personal engagement with language analysis gives insights into how participants envision their future and why they desire it.

4. Conclusion, discussion, and next steps

This analysis positions the MDCH method within 'design for research' methodologies. While not exhaustive, it provides a foundation for understanding its core objectives and relation to existing approaches. The MDCH adds the concept of 'value friction' to the social design practice and ethics research. This value friction will be mapped in an overview of the many different visions, opinions, discourses, and underlying values about moral and technological issues of a city's inhabitants.

The Moral Data City Hunt pilot project will launch in five Dutch municipalities in May 2025. After the pilot research, the design will be adapted to new insights. A second research round will take place in 2026. At the end of the Raak project Moral Smart City, the aim is to design a techno-moral decision-making framework for decentralized authorities; the findings of the MDCH method will be connected to different stakeholders in the Smart Cities trajectory to construct a consistent and scientifically solidly anchored whole.

To properly understand, analyse, and apply the concept of value friction in designing a smart city, the Moral Smart City Project continues its research. In the design research, the project group will investigate methods for conducting surveys with as many people as possible in the city. Parts of the Moral Data City Hunt need more scientific substantiation, starting with the value dictionary as a data-analysing tool. More research will also be done on interviewing participants as openly as possible. Finally, researching the continuous feedback loop in the MDCH is also of interest.

By employing speculative design, empirical ethics and conducting open interviews with language analysis, it is possible to identify the value friction inherent in the use of new technology. By mapping friction, the MDCH gathers insights into pluralistic values in society. The feedback loop helps facilitate the urban transition from citizens' often limited understandings and abstract perceptions of emerging technologies to a collaborative process of co-design and inclusive discussions. Friction helps develop design principles that are not the result of a compromise but rather something better. This valuable input enables policymakers and companies to develop a clear strategy for addressing this new technology.

This project focuses on 'the transformation of the future' by helping governments collect insights to create cities that are not only smart but also caring. With the rapid spread of AI and the likely imminent introduction of Generative AI in all fields, the urgency of designing from human morality and the fundamental principles of a democratic rule of law only increases.

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MAPPING THE INTERSECTIONS OF DESIGN AND POLICY: TOWARDS AN ANALYTICAL TAXONOMY OF DESIGN FOR CLIMATE POLICY.

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ABSTRACT | In response to the climate crisis, governments are under increasing pressure to drive transformation across all sectors, from services to policies. This study examines the increasing influence of "design for policy" as a novel approach to policymaking. The aim is to explore how design can meaningfully contribute to climate policy innovation by proposing a structured analytical framework that positions design thinking within this critical policy domain. An integrative literature review is conducted to analyse climate policy through three key dimensions: goals, challenges and processes, adopting the heuristic developed by Kimbell et al. (2023). Three main insights emerge. First, as climate policy goals are often complex and contested, design should be able to negotiate trade-offs, integrate mitigation and adaptation strategies, and support the mainstreaming of climate action in other policy domains. Second, climate policy faces multi-level challenges in terms of spatial, temporal, and institutional differences among the actors involved. Design should facilitate coordination, stakeholder engagement, and the redefinition of roles and responsibilities. Third, the climate policy process requires balancing scientific legitimacy with political feasibility, navigating a shifting political agenda and expanding current measurement indicators. Design should support the rethinking of climate policymaking towards long-term, institutionalised processes of knowledge co-creation; adopt a systems-oriented perspective; and introduce alternative, human-centred indicators. While limited by its theoretical scope, this study offers a practical framework for collaboration between researchers and practitioners working at the intersection of design and climate policy.

KEYWORDS | PUBLIC SECTOR INNOVATION; POLICYMAKING; SUSTAINABILITY TRANSITIONS

1. Design in the climate crisis

On a warming planet, environmental changes are expected to impact socio-economic systems, leading to less favourable conditions for human development and prosperity (Rockström et al., 2009). Vulnerable populations, who have contributed the least to the current climate crisis, are likely to suffer the most and require enormous adaptation efforts, which they often lack the resources and capacity to undertake (Bosello et al., 2009). Governments around the world will need to find strategies to mitigate climate change while adapting to extreme weather events, mass migration and unprecedented environmental conditions (Khan and Roberts, 2013). Although adaptation and mitigation measures have become core elements of public policy and financial resources have been mobilised - see, among others, the European Commission's policy and research programmes such as the European Green Deal and Horizon Europe - the pace of climate policy innovation at all levels of governance appears inadequate when compared to the latest scientific projections of future climate impacts (Jordan and Huitema, 2014). The nexus of climate change, policy and innovation gives new meaning to the recent expansion of design-oriented approaches into the public sector as forces capable of disrupting and innovating traditional administrative structures, processes and policies (Blomkamp, 2018). Governments are not new to applying design principles to public sector services, especially regarding new ways to develop participatory practices and public services co-production (Sanders and Stappers, 2008). In the context of public sector innovation, a variety of design approaches—such as design thinking, service design, and user experience design—are being promoted as a promising development for several reasons. First, design is said to foster creativity and develop the innovation skills of public officials at different levels of government, from national to local. Second, it has been argued that design can integrate insights from different expertise, sources and actors, cutting across the notoriously siloed structures of public bodies and increasing the chances of successful service implementation (Hermus et al., 2020). It is only since the late 1990s, however, that design thinking gained significant attention for policy making (McGann et al., 2018). More recently, the application of design thinking in this public policy developed into a distinct body of literature under the umbrella concept of 'design for policy', coined by Bason (2014), which refers to the adoption of a design approach by policymakers to solve complex policy challenges (e.g. climate change). The initial exploration of design for policy points to three key contributions. First, it offers rich, user-centred research methods that help to uncover the root causes and systemic nature of policy issues (e.g. climate change). Second, it enables collaboration by facilitating co-creation among diverse stakeholders within the policy cycle through visual tools and creative processes (e.g. visual artefacts). Third, it makes policy tangible by designing concepts, services, and experiences that enhance usability, engagement and emotional connection (e.g. prototypes). The recent proliferation of Public Sector Innovation Spaces (PSIs) has accelerated the interest in and spread of design for policy, with some authors suggesting that the PSIs and their toolkits are on their way to becoming a pervasive part of the social infrastructure of modern public organisations (Carstensen and Bason, 2012). However, some authors have questioned whether design thinking can meet the challenges faced by policymakers, whose sectoral knowledge in a specific field of intervention is intertwined with a deep understanding of the politics of policy making. This research aims to explore the potential contributions of design for climate policy by providing a structured analytical framework that situates design for policy characteristics within such a critical and highly political policy domain.

According to Kimbell et al. (2023), the initial conceptualization of design for policy, based on traits like human-centeredness, creativity, anticipation, visualisation, and prototyping, arguably overstates design's uniqueness compared to other disciplines that foster

innovation or integrate lived experience into policy (e.g. sociology, anthropology, future studies). Furthermore, critics highlight design's naivety in addressing politically contentious decisions, scalability, governance models and policy mixes (Clarke & Craft, 2019). While design for policy emphasizes innovation, it tends to neglect how policy processes handle barriers like political feasibility and decision-making, making it less adaptive to address the conflictual nature of democratic instances (Howlett, 2020). This is further discussed by Villa Alvarez et al. (2022), whose research examines the design activities of PSI spaces and maps them to the policy making phases and stages defined by Howlett (2009). Their findings indicate that design is less present in the decision-making stage and in stages where formal decisions are made, such as: getting an issue on the formal agenda, consolidating a policy, legal-administrative processes, and policy feedback and termination. This may be because these stages are inherently political, conflictual and involve decisions made primarily by authorised decision-makers (e.g. elected representatives empowered to make binding public decisions). Unlike the initial traits that marked the concept of design for policy, its characteristics appear to be multifaceted, depending on how and where it is applied, by whom, and its implications for policy making. Kimbell et al. (2023) proposed a heuristic model to make sense of this complexity. The authors distinguished three propositions: the first relates to design as a "tool for policy making", where it supports the achievement of predefined policy goals; the second refers to design as a "practice of improvising within policy making", where it fosters adaptability and openness in response to unfolding policy challenges; the final proposition frames design as "regenerating policy making", where it enables a fundamental re-envisioning of policy making process itself. When applied to climate policy, these different propositions of design for policy take on a critical perspective. The scale and urgency of the climate crisis demand bold action, yet governments frequently exhibit risk aversion, opting for procedural strategies that mitigate political fallout rather than addressing the root causes of climate change (Howlett, 2014a). Design professionals and researchers who wish to contribute to realising the full potential of design in the context of climate policy should consider the characteristics of such a critical endeavour. To this end, the research applies Kimbell et al.'s heuristic to analyse climate policy through three dimensions: goals—linked to the first proposition, design as a tool for policymaking; challenges—corresponding to the second proposition, design as a practice of improvisation in policymaking; and processes—reflecting the third proposition, design as regenerating policymaking. In this regard, three research questions are derived to guide the analysis as illustrated in Figure 1.

Design for policy characteristics	Purpose of design	Example	Design outcome on public policy	Design for climate policy - Research questions
Design as a tool for policy making	to support achieving specified goals of policy making	Design toolkit	Supporting to solve specific **goals**	What are the **goals** of climate policy?
Design as a practice of improvising within policy-making	to enable policy-making to be more open in the face of unfolding events and experiences	Living labs	Enable policy making to tackle unfolding **challenges**	What are the main **challenges** of climate policy?
Design regenerating policymaking	to facilitate the re-envisioning of policy making	Creative futuring	Re-envisioning the **process** of policymaking	What defines the **process** of climate policy making?

Figure 1. The proposed analytical research framework, adapted by Kimbell et al. (2023)

This study provides a concrete analytical grounding that can inform future contributions within the broader field of design for policy, as well as among design practitioners seeking to address the climate crisis. First, the three focal areas—goals, challenges, and process—are investigated through an integrative literature review (Lubbe et al., 2020). Second, the findings are discussed considering Kimbell et al.'s heuristic model. Finally, the paper outlines key implications for design theory and practice.

2. Methodology

The production of literature on climate policy has proliferated in recent years (Boasson and Tatham, 2023). While this has advanced research across disciplines, it has also introduced significant complexity, particularly in identifying the key challenges of climate policy and climate policymaking. Given the aim of this study, which is to explore the potential contributions of design for policy by providing a structured analytical framework that situates the characteristics of this developing discipline within the context of climate policy, an integrative literature review was conducted. Specifically, this research adopts the integrative review methodology outlined by Lubbe et al. (2020), which is particularly suited to synthesising different forms of knowledge and developing theory in emerging fields. The review triangulated evidence from academic literature, national and international policy reports, discussion papers, and institutional documentation. Data sources included peer-reviewed databases such as Google Scholar, Scopus, and Web of Science. The following search terms were used in various combinations to capture relevant content: "policy design", "climate policy challenges", "climate policy goals", "policy-making process", and "design for policy". Literature selection followed an iterative

screening process based on relevance to extract information useful for providing a clear picture of climate policy goals, challenges and the policy-making process. Particular attention is paid to refining the classification of these three aspects under review. As Bailey (1994) noted, the lack of clear classification inhibits advanced conceptualisation and reasoning, which may be one of the obstacles in attempting to define the potential contribution of design for policy to climate policy. Classification, defined as the process of grouping entities based on shared characteristics, relies on the careful identification of key dimensions or variables. A poorly defined classification framework risks compromising analytical clarity and leading to ambiguous definitions of the specific relationship between design and climate policy. With this framework in mind, the following sections explore how design intersects with climate policy goals, challenges, and processes.

3. Climate policy: goals, challenges, and process

3.1. A complex phenomenon: climate crisis

The latest report from the Copernicus Institute claims that 2024 saw unprecedented global temperatures, marking the second consecutive year of record-breaking events after the exceptional 2023 (Copernicus Climate Change Service, 2024). Notably, 2024 was also the first year in which average temperatures exceeded 1.5°C above pre-industrial levels, the threshold set by the Paris Agreement to significantly reduce the risks and impacts of climate change. It was marked by the breaking of several global records, for greenhouse gas levels, air, and sea surface temperatures. These conditions contributed to extreme weather events, including floods, heatwaves and wildfires. Human activity, primarily through the emission of greenhouse gases, has been identified as the primary cause of global warming and its devastating and dramatic impacts (Calvin et al., 2023). Reversing the current climate crisis will require far-reaching and unprecedented changes in all sectors of society. This is because climate change is a complex phenomenon that links natural and built ecosystems with biodiversity, human societies with diverse forms of knowledge and values, cultures with traditions, and ecosystem health with human well-being and sustainable development. Actors involved in implementing climate change adaptation and mitigation measures operate at different spatial and institutional scales and represent different sectoral interests, which adds to the multifaceted nature of climate change (Ryan, 2015). Recently in Europe, there has been a shift in public sensibility towards recent European Commission initiatives on ecological transitions, such as the European Green Deal, highlighting the problem of the social desirability of this transition (Fondazione Symbola, 2024). Given this recent turmoil, it is inescapable that social, economic and political factors must be considered when identifying, designing and implementing solutions against climate change. This is true not only for policy, but also for science: the Global Sustainable Development Report (United Nations, 2023) advocates a transformation driven by and within science, recognising that scientific progress on climate change should also foster social innovation, and calls for scientists, policy-makers and diverse societal actors to work together at the science-policy-society interface, translating knowledge into policy and policy into effective climate action. The hybrid nature of climate interventions—spanning science, society, and policy—creates significant challenges in formulating and implementing effective climate policies, and in the definition of their goals (Sabel and Victor, 2024).

3.2 Climate policy goals

Climate policy refers to sectoral or overarching policies that lead to lasting reductions in emissions and adaptation to extreme environmental conditions because of rising global temperatures (Nascimento et al., 2022). Since it first emerged as a critical issue for global policymakers, climate policy has been largely synonymous with energy policy, mainly in terms of mitigation efforts and less so in terms of adaptation, as energy supply is dominated by fossil fuels, the main source of anthropogenic greenhouse gas emissions (Klein et al., 2005). It is only recently that climate policy has received significant attention in its two main components: mitigation and adaptation. It is noteworthy that these two components may exhibit a range of interactions, including competition, reinforcement, or even the overcoming of one by the other (Klein et al., 2007). Climate change mitigation is designed to minimise the extent of climate change and refer to anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases (IPCC, 2001). Whereas climate change adaptation is intended to minimise risks and seize upon new opportunities. It refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC, 2001). The first two key goals of climate policy are therefore to control greenhouse gas concentrations in the atmosphere - the focus of mitigation measures - and to prepare for and reduce the adverse impacts of climate change while taking advantage of opportunities - the focus of adaptation interventions. Climate policy however should not only be concerned with the design of adaptative and mitigative interventions. A primary concern should also be to address development and equity issues, as policy implementation is intrinsically linked to socio-economic development (Fondazione Symbola, 2024). Failing to acknowledge this societal dimension might further decrease the chance to diffuse innovative approaches to tackle climate change (United Nations, New York, 2023). Finally, despite the centrality of mitigation and adaptation in the definition of climate policy itself, some authors have argued whether finding the perfect balance or mix of both measures should be the primary objective of climate policy. According to Klein et al. (2005), rather than directly implementing mitigation and adaptation measures, climate policy should facilitate their integration into sectoral policies (e.g., transport, trade, and energy). This perspective aligns with the broader recognition that climate policy cannot function in isolation (Tol, 2013). Instead, it must be an integral and complementary part of all relevant policies to ensure its relevance as climate conditions evolve and their consequences become more visible (Biesbroek et al., 2010). Lastly, the successful implementation of climate policy is closely linked to the extent to which governments can learn about mitigation and adaptation capacity at all levels of government and in all processes, and to create mechanisms and incentives for mainstreaming climate action (Tompkins and Adger, 2005; Berrang-Ford et al., 2014). If climate policy and sustainable development are to be achieved in an integrated manner, it is essential to explore the determinants of response capacity that shape policy options and their links to socio-economic and technological development pathways (Swart et al., 2003). The landscape of climate goals appears complex and multifaceted. Figure 2 summarises the five key goals derived from the literature review.

Climate Policy Goals	Description	Literature
Control atmospheric greenhouse gas concentrations.	Focus of mitigation; aims to reduce sources or enhance sinks of greenhouse gases.	IPCC (2001); Klein et al. (2005); Nascimento et al. (2022)
Prepare for and reduce adverse climate change impacts, and exploit emerging opportunities.	Focus of adaptation; adjusting systems in response to climatic stimuli to reduce harm or exploit benefits.	IPCC (2001); Klein et al. (2007); Nascimento et al. (2022)
Address development and equity issues.	Recognizes socio-economic factors as key to climate policy success and innovation diffusion.	United Nations, New York (2023); Fondazione Symbola (2024)
Facilitate development and implementation of mitigation and adaptation within sectoral policies.	Encourages integration into broader policy areas like transport, energy, and trade.	Klein et al. (2005); Biesbroek et al. (2010); Tol (2013)
Create mechanisms and incentives for mainstreaming climate action (responsive capacity building).	Emphasizes learning, capacity building, and policy integration at all levels of governance.	Swart et al. (2003); Tompkins and Adger (2005); Berrang-Ford et al., 2014;

Figure 2. Climate policy goals landscape

3.2 Climate policy challenges

Among the many challenges posed by climate policy, Berrang-Ford et al. (2014) identify good governance as a critical and central condition for enabling climate-resilient development through individual and collective action. This aspect emphasizes the necessity of coordinated efforts between governments, civil society, and the private sector to implement greenhouse gas mitigation and adaptation measures supporting sustainable development. However, coordination does not come effortlessly. Mitigation and adaptation operate at different scales—mitigation falls under international policies and is analysed through macroeconomic models, while adaptation takes the form of local, project-based activities with site-specific relevance, embedding a microeconomic perspective (Bosello et al., 2010). In addition, the identification of the actors involved or to-be-involved and their responsibilities remains ambiguous for both mitigation and adaptation. Klein et al. (2005) note that mitigation primarily involves the energy and transportation sectors in industrialized countries, as well as the energy and forestry sectors in developing nations, with the agriculture industry also playing a major role. These sectors are closely linked to national planning and policy making. Adaptation, on the other hand, encompasses a wider range of sectoral interests, including tourism, health, water supply, coastal management, urban planning and nature conservation, with decisions being taken from the micro level - such as by individual farmers - to the macro level - for example by national agencies. The characterisation of stakeholders engaged in climate policy can be approached through various lenses, including their organisational structure (e.g. public or private or a mixed combination), the level of decision-making involved (e.g. political, strategic planning or more operational implementation), the spatial scale (e.g. local, national, international or supranational), the time span of interest

(e.g. short to long term - particularly in the difference between mitigation and adaptation), and their function within a network (e.g. single actor, stakeholder regime or multi-actor constellations) (Klein et al., 2007). Differing perceptions of responsibility between actor groups and between different levels of governance further limit the implementation of effective responses to climate change adaptation (Mees et al., 2017; Ulibarri et al., 2022). For instance, although inclusive governance is regarded as a key condition for facilitating climate-resilient development, Petzold et al. (2023) study revealed that individuals and households—who implement nearly 64% of adaptation measures—are the least involved in co-designing responses with other actors (private sector, governments at various levels, academia, and civil society). This is a key concern, as the study by Biesbroek et al. (2010) and Mees et al. (2012) also emphasises that climate policy implementation cannot take place in isolation, but requires the coordinated efforts of public and private actors at all levels of government, making it a multi-level governance challenge. Finally, a persistent obstacle to adaptation and mitigation, despite the growing attention to climate change in policy and science, is the widespread lack of understanding of the climate problem and its potential impacts on daily life among the multitude of actors that characterise climate change issues (Lorenzoni and Pidgeon, 2006; Lorenzoni et al., 2007; Baiardi, 2022). Figure 3 synthesizes the four main challenges that emerged from the literature review.

Climate Policy Challenges	Description	Literature
Mitigation and adaptation measures can be mutually reinforcing or detrimental to each other.	Mitigation is global, long-term, and macroeconomic; adaptation is local, short-term, and microeconomic. Resource scarcity can cause friction between the two.	Klein et al. (2005); Klein et al. (2007); Bosello et al. (2010); IPCC (2023)
Actors involved operate at different spatial, temporal, and institutional scales with unclear roles and responsibilities.	Different sectors and governance levels are involved, with conflicting perceptions of responsibility and ambiguous mandates.	Klein et al. (2005); Klein et al. (2007); Mees et al. (2017); Ulibarri et al. (2022)
Implementation requires coordinated, multi-level governance.	Effective climate policy requires collaboration across public and private sectors and all levels of governance.	Berrang-Ford et al. (2014); Biesbroek et al. (2010); Mees et al. (2012); Petzold et al. (2023)
Lack of understanding of climate change and its impacts among diverse stakeholders.	Despite increased attention, many actors lack awareness of the relevance of climate change to their daily lives, which limits their engagement and commitment.	Lorenzoni and Pidgeon (2006); Lorenzoni et al. (2007); Baiardi (2022)

Figure 3. Climate policy challenges landscape

3.3 Climate policy process

Climate adaptation and mitigation strategies must be grounded in robust scientific evidence to be effective in addressing the climate crisis. The process of designing climate policy requires a careful translation of scientific data into actionable insights for policymakers. This translation process, in turn, depends on strong coordination and collaboration across scientific, policy, and societal actors. The latest IPCC report has

identified appropriate decision-making, coordination processes and structures as enabling conditions for responding to climate change effectively (IPCC, 2022). Furthermore, the systemic, long-term and cross-border nature of the climate crisis requires the flexibility to leverage multiple models of decision-making across different contexts and time. Integrated, agile, evidence-based and collaborative policy action is seen as a key attribute to increase political buy-in, avoid inertia and policy stagnation, and balance short- and long-term goals and needs (Kaur, M. et al., 2023). The nature of adaptation and mitigation decisions changes over time as climate might change in less unpredictable ways, also affecting the process of designing climate policy. For example, some decisions may have started with relatively simple measures, such as the adoption of low-cost supply and demand options in the energy sector, and evolved into complex intervention plans and strategies (see for instance the "Piano Clima" of the city of Rome in Italy, Comune di Roma, 2024). As previously discussed, the complex nature of climate change necessitates a thorough examination of climate science, systemic thinking, and multidisciplinary approaches. However, political actors might appear reluctant to implement policies that may lead to unpopular choices, which could potentially affect their chances of being re-elected. It has been observed that a significant discrepancy between the implications of climate science and the outcomes of climate policy can render current and planned policies inadequate in achieving the goals of the Paris Agreement (Meckling et al., 2015). The tension and struggle to produce practical outcomes for policymakers while maintaining legitimacy and scientific credibility further undermines the capacity of governments to address climate change (Niederberger, 2005; Sarewitz and Pielke, 2007). Translating scientific knowledge into a policy framework is not easy. The analysis conducted by Ryan and Bustos (2019) in Latin America highlighted how the fragmentation and lack of integration of the knowledge available on the different aspects of climate adaptation issues deeply affect their usability in policy processes. It appears that co-creation and collaborative modes of knowledge production in the field of climate adaptation do not tend to sustain over time. Climate change knowledge and co-production processes tend to be project based, fragmented, and linked to specific initiatives rather than to institutionalized long-term policy making or planning processes. Boundary organisations represent a key role in this regard, as they are specialised entities established to facilitate the dissemination of accessible scientific information in a more coherent manner (Gustafsson and Lidskog, 2018).

Jordan and Huitema (2014) adopt a more holistic approach to understanding the process of climate policy innovation, covering the source of new policy elements ('invention'), their wider entry into use ('diffusion'), and their projected and/ or real effects ('evaluation'). Invention of policies happen mainly through the activities of "policy entrepreneurs", who are politically relevant actors that are capable of overcoming process challenges such as shifting political agendas, political argumentation, capacity limitations, eventually finding new connections between politics and policy problems. Diffusion is defined as the process through which inventions circulate and potentially enter common use via learning, transfer, and adoption. Here, the primary issue is that information is poorly coordinated at the national and international level, with many different organisations contributing knowledge in an ad hoc fashion (Biesbroek et al., 2010). Finally, in the evaluation of new policies, a key challenge lies in defining the right metrics to assess their effectiveness. Traditional evaluations often focus on tangible outcomes, such as greenhouse gas emission reductions. However, this approach risks neglecting broader societal benefits that are equally important in assessing the overall impact of climate policies (Sudmant et al., 2024). In conclusion, five characteristics describing the climate policy-making process can be derived from the literature review and summarized in Figure 4.

Climate Policy Process' characteristics	Description	Literature
Duality of producing practical results while maintaining legitimacy and scientific credibility.	Tension between producing actionable policy and preserving scientific integrity; politicisation risks.	Niederberger (2005); Sarewitz and Pielke (2007); Meckling et al. (2015)
Lack of continuity in knowledge co-creation processes limits sustained policy-research relationships.	Knowledge creation tends to be fragmented and not embedded in long-term institutional frameworks.	Ryan and Bustos (2019); Gustafsson and Lidskog (2018)
Invention of new policies must navigate political dynamics and capacity limits.	Policy entrepreneurs must overcome agenda shifts, political resistance, and resource constraints.	Jordan and Huitema (2014)
Diffusion of climate information is poorly coordinated and often ad hoc .	Multiple actors produce and share knowledge in fragmented ways, limiting national-level coherence.	Biesbroek et al. (2010); Jordan and Huitema (2014)
Evaluation needs to go beyond GHG metrics to include societal impacts.	Effective evaluation must consider both environmental and social outcomes of climate policy.	Jordan and Huitema (2014); Sudmant et al. (2024)

Figure 4. Climate policy process landscape

4. Design for climate policy

In the public sector, policy and design activities are in constant dialogue. Public policy emerges from the efforts of governments to transform socio-technical systems. These systems are addressed either through direct intervention in the production, consumption and dismantling of products and services, or through indirect intervention in the internal processes of government that facilitate these creative processes. These efforts can be designed to a greater or lesser extent, and the goals and purposes sought to be achieved through such design are broad and varied (Howlett, 2014b). In design terms, policy defines the typologies of services and products, the relationships and interactions that are considered possible, encouraged or discouraged in each human system (Junginger, 2013). Therefore, in the context of the public sector, design is both the realisation and materialisation of policy as products and services and the formalisation of the policy-making process. Neither design nor policy can be considered in isolation. Design for policy is an emerging discipline that explores this intertwined relationship. Three distinct propositions of design for policy have been identified by Kimbell et al. (2023) to describe this relationship: design as a tool for policymaking; design as a practice of improvising within policymaking; and design regenerating policymaking. According to the authors, the outcome of the first proposition is to support the achievement of predefined policy goals; that of the second is to promote adaptability and openness in response to unfolding policy challenges; and finally, the outcome of the third proposition is to enable a fundamental rethinking of the policymaking process itself. These three outcome spaces, namely goals, challenges and process, were examined in the context of climate policy, as the aim of this study is to provide a concrete analytical basis to facilitate a better understanding of the contributions of design for policy to the climate crisis for both practitioners and researchers. Through an integrative literature review, each outcome space has been examined, and a set of characteristics has been identified.

4.1 Design as a tool for policymaking

The first proposition, 'Design as a tool for policy making', suggests that the contribution of design to policy is to support the achievement of specified policy goals and effective policy implementation (Kimbell et al., 2023). In this context, policy making is conceptualised as a distinct form of technical expertise operating within a defined worldview. The relationship between design and policy is characterised by the application of design to facilitate the generation and delivery of solutions to existing goals. For instance, in the study by Quilty et al. (2024), design is used as a powerful tool to deepen stakeholder understanding and stimulate new thinking in net zero projects at the district level. The authors developed a set of cards to be used in design ethnography workshops at Monash University in Victoria, Australia, as part of a project that combines design anthropology and transition management approaches to explore innovative pathways to net zero at the neighbourhood level. The result of the study shows how design artefacts might be a powerful tool for accelerating the implementation of existing climate policy goals, while also favouring a widespread understanding of climate change and its consequences. This example addresses one of the five climate policy goals that emerged from the integrative literature review: controlling atmospheric greenhouse gas concentrations. As illustrated in Figure 5, new research questions arise at the intersection between the initial proposition identified by Kimbell et al. (2023) and the climate policy goals identified. These involve defining strategies, interventions, products or services that could facilitate the creation of policies to effectively manage emissions, anticipate and respond to climate impacts, incorporate equity and development concerns, integrate adaptive and mitigative capacities into other policy domains, and establish mechanisms and incentives for the mainstreaming of climate action. Possible contributions of design to climate policy could include setting a shared vision of possible adaptive and mitigative futures for human and non-human actors; opening up climate policymaking to groups at risk of exclusion and marginalisation due to climate change; designing instruments and tools that integrate climate actions across policy domains; and embedding design techniques and methodologies to create engaging climate action capacity-building efforts at different government levels.

Kimbell's et al. (2023) proposition	Climate Policy Goals	Design for climate policy RQ	Expected contributions of "Design as a tool for climate policy making"
Design as a tool for policy making	Control atmospheric greenhouse gas concentrations.	How does design contribute to the definition of policies that can control atmospheric greenhouse gas concentrations?	*Set a shared vision and imagination on possible mitigative and adaptive futures for human and non-human actors.*
	Prepare for and reduce adverse climate change impacts, and the exploitation of emerging opportunities.	To what extent can design prepare for and mitigate the adverse effects of climate change and take advantage of the opportunities it offers through policy-making?	
	Address development and equity issues.	How could design address development and equity issues in climate policy?;	*Open up the field of climate policymaking to groups at risk of exclusion and marginalisation due to climate change.*
	Facilitate the development and implementation of specific mitigation and adaptation options as part of sectoral policies (e.g. transport, trade, energy, etc.).	How could design facilitate developing and implementing specific mitigation and adaptation options within sectoral policies (e.g. transport, trade, energy, etc.)?	*Design of instruments and tools to facilitate the integration of climate actions across other policy domains.*
	Create mechanisms and incentives for mainstreaming climate action across all governmental levels and processes (responsive capacity building).	How does design create mechanisms and incentives for the mainstreaming of climate change into all levels and processes of government (responsive capacity building)?	*Include design techniques and methodologies to create engaging and compelling climate action capacity-building efforts at different government levels.*

Figure 5. Design as a tool for climate policy's RQ and expected contributions

4.2 Design as a practice of improvising within policy making

The second proposition identified by Kimbell et al. (2023) describes 'design as a practice of improvisation within policy making'. In this context, design enables policy making to be more improvisational and experimental in the face of complexity and uncertainty. Policy making is understood as a responsive process in which policy must necessarily negotiate between different worldviews (e.g. different stakeholder interests). Design and policy interact here in such a way that design is used to modify and extend existing policy, based on engagement with lived experience and diverse positions and expertise, thereby bridging the gap between policy and implementation. In Salinas (2022), "world-building preferable futures through critical service design" are introduced as a participatory approach to local policy design. The context of application is the Climate Studio initiative at the University of the Arts London (UAL), which brings together citizens, organizations, and government actors to engage in collaborative, place-based climate action. Through workshops and scenario-building exercises, participants co-created policy challenges and solutions, challenging traditional linear policy processes and fostering multi-stakeholder alignment. This example addresses one of the four climate challenges that emerged from the integrative literature review: the complexity of multi-level governance models. Figure 6 summarises the findings of the review and suggests research questions

for practitioners and academics. In this context, design for policy should address the antagonistic and interdependent mitigation-adaptation relationship. Furthermore, integrating different interests across multiple spatial, temporal, and institutional scales should be emphasised as a critical aspect of research. This should not overlook the need to design multi-level governance models or the difficulty of mobilising and sustaining public interest in relation to climate change. Design could contribute to climate policy-making challenges by enabling the integration of systemic design practices to bridge the gap between mitigation and adaptation actions, facilitating the development of a shared language and common understanding of the roles and responsibilities of various stakeholders, enabling cross-collaboration through participatory design that activate multilevel, multi stakeholder governance models, and fostering knowledge transfer between the scientific community and non-scientific recipients in climate policy-making.

Kimbell's et al. (2023) proposition	**Climate Policy Challenges**	**Design for climate policy RQ**	**Expected contributions of "Design as a practice of improvising" within climate policy making**
Design as a practice of improvising within policy making	Mitigation and adaptation measures can be mutually reinforcing or detrimental to each other.	How can design-led approaches facilitate the integration of mitigation and adaptation policies at global and local scales, ensuring coherence between long-term strategic goals and short-term, context-specific actions?	*Enable the integration of systemic design practices in policymaking to bridge the gap between mitigation and adaptation actions.*
	Actors involved operate at different spatial, temporal, and institutional scales with unclear roles and responsibilities.	How can design help clarify the roles, responsibilities and expectations of different actors operating at different spatial, temporal and institutional levels in climate policy?	*Facilitate the development of a shared language and a common understanding of the roles and responsibilities of the various stakeholders involved in climate policy-making.*
	Implementation requires coordinated, multi-level governance.	Which design process can support the coordination and alignment of public and private actors to promote a multi-level climate governance model?	*Enable cross-collaborative innovation through participatory design that activate multilevel and multistakeholder governance in climate policymaking.*
	Lack of understanding of climate change and its impacts among diverse stakeholders.	How can design for policy enhance public understanding of climate change by translating abstract scientific knowledge into tangible narratives that resonate with everyday experiences and motivate sustained engagement?	*Facilitate knowledge transfer between the scientific community and non-scientific stakeholders involved in climate policy.*

Figure 6. Design as a practice of improvising within climate policy making's RQ and expected contributions

4.3 Design regenerating policy making

Finally, the third proposition, defined by Kimbell et al. (2023) as 'design regenerates policy making', appears to be the most ambiguous and multifaceted type of relationship between design and policy. Within this third proposition, the purpose of design is to challenge or unsettle assumptions embedded in policy making and enable revitalisation of stalled policy processes. Here, policy making is understood as a generative or even agonistic space where policy emerges from the decentring of different worldviews.

Design and policy thus interact here in such a way that design is used to re-imagine the basis for policy making, challenging the way policy issues are framed, and policies are designed and implemented. Lähteenoja et al. (2023) illustrate how design can contribute to reinventing policy making at the strategic level to shape innovative national sustainable strategies. The authors examined the dynamics of co-design in the formulation of a national sustainable development strategy in Finland. The study highlights the instrumental, attitudinal and intellectual contributions of design to policy formulation, complementing sustainable transition expertise with design methodologies. This study exemplifies how design can innovate policy-making processes. As Kimbell et al. (2023) have highlighted, this is the most recent and complex use of design in policymaking, perhaps because it touches on complex political issues and strategic decision-making processes, challenging the status quo of how policy is designed. In this regard, the findings of the literature review pose new questions for design practitioners and researchers, as summarized in Figure 7. These focus on balancing science and politics in design for climate policy, and on fostering co-creative processes that are institutionalised and sustained over time to avoid incoherence. Furthermore, new research should explore ways to facilitate the development of a new generation of climate policies that can navigate evolving political agendas with a forward-looking approach. It is also critical to explore both the vertical diffusion of climate knowledge within a country and the horizontal diffusion across nations, as well as considering other metrics and measurement approaches beyond GHG emissions to understand the impact of climate policy. A set of suggested design contributions include: the creation of boundary objects, spaces, and experiences to allow interconnection between science and politics in climate policymaking; redesigning the policy cycle to permanently embed knowledge co-production processes on climate change issues; embedding speculative design and future foresight in the innovation process to create a more forward-thinking approach; democratising access to scientific knowledge that is understandable and relatable to increase awareness and participation in climate policymaking; and extending the current measurement approach in climate policymaking by introducing new human- and planet-centred metrics.

Kimbell's et al. (2023) proposition	Climate Policy Process	Design for climate policy RQ	Expected contributions of "Design regenerates climate policy making"
Design regenerating policymaking	Duality of producing practical results while maintaining legitimacy and scientific credibility.	How can design for policy mediate between scientific knowledge and political decision-making to ensure both practical relevance and scientific legitimacy in the development of climate adaptation and mitigation strategies?	*Design boundary objects, spaces and experiences to allow for interconnection between science and politics in climate policymaking.*
	Lack of continuity in knowledge co-creation processes limits sustained policy-research relationships.	What design strategies can support the institutionalization of co-production practices in climate policy, moving beyond one-off projects toward embedded, long-term participatory governance?	*Redesign the policy cycle for climate policymaking to embed knowledge co-production processes on climate change issues on a permanent basis.*
	Invention of new policies must navigate political dynamics and capacity limits.	In what ways can speculative and future-oriented design practices support the invention of adaptive climate policies that remain resilient in the face of shifting political agendas and institutional capacity limitations?	*Embed speculative design and future foresight in the innovation process of climate policymaking to create a more forward-thinking approach.*
	Diffusion of climate information is poorly coordinated and often ad hoc.	How can design-led visualization and communication tools be employed to improve the coherence and accessibility of climate knowledge across national policy networks and organizational boundaries?	*Democratize the access to scientific knowledge that is understandable and relatable in order to increase awareness and participation in climate policy-making*
	Evaluation needs to go beyond GHG metrics to include societal impacts.	What role can design play in developing new frameworks and indicators for evaluating climate policies that account for both quantitative outcomes (e.g., GHG reductions) and qualitative societal benefits?	*Extend the current measurement approach in climate policymaking by introducing new human and planet centred metrics*

Figure 7. Design regenerating climate climate policy making's RQ and expected contributions

5. Conclusions

Climate change can be understood as a particularly complex form of a "wicked problem," as defined by Rittel and Webber (1973). Its causes are diffuse and deeply rooted, while its impacts span social, economic, and environmental domains. Design has long been recognized as a promising approach for addressing such multifaceted challenges (Buchanan, 1992). The recent expansion of design into the realm of public policy - referred to as "design for policy" (Bason, 2014) - raises important and urgent questions about the intersection of design, policy, and climate change. This research offered a structured analytical framework that situates design for policy within the critical and highly political domain of climate policymaking. Three key areas are considered: climate policy goals, challenges and process. These are derived from the heuristic developed by Kimbell et al.

(2023). The model describes the relation between policy and design through three propositions: (1) design as a tool for policy making, where design supports achieving specified policy goals; (2) design as a practice of improvising within policy making, where design fosters diversity and openness in response to unfolding policy challenges; and (3) design regenerating policy making, where design facilitates a fundamental re-envisioning of the policy-making process. Through an integrative literature review, climate policy goals, challenges, and process are scrutinized and a set of implications for design for climate policy are derived. The first cluster—goals—suggests that design should contribute to the development of strategies, interventions, and services that help reduce emissions, design adaptation to extreme events, address equity and development concerns, and integrate adaptative and mitigative efforts across policy domains. The second—challenges—highlights the need for design to address the interdependence and often conflictual relationship between mitigation and adaptation, support multi-level governance models, and foster broader public engagement across spatial, temporal, and institutional scales. The third—process—underscores the importance of balancing scientific legitimacy with political feasibility, sustaining knowledge co-production processes between experts and policymakers, and identifying new indicators for climate policy that can capture the complexity of climate interventions. Design should enable institutionalized knowledge co-production processes, support the emergence and diffusion of systemic and future-oriented policy innovations, and contribute to developing evaluation frameworks that go beyond GHG metrics to also include societal impacts.

While this study offers a conceptual contribution by mapping climate policy characteristics against Kimbell et al.'s heuristic (2023), it remains theoretical in nature, relying exclusively on literature rather than empirical data. The lack of case study validation limits the ability to assess how design operates in real-world climate policy contexts. Moreover, the integrative review, while broad in scope, may have overlooked relevant grey literature or emerging local initiatives not captured in major academic databases. The categorization into three clusters - goals, challenges, and process - serves as a useful analytical device, but inevitably simplifies the complexity and interdependence of climate policy issues. Finally, a more thorough investigation of the suggested design contributions for climate policy is needed to reflect both on the positive and negative impacts that the application of design thinking may have in this context. Future research should empirically test and refine this framework through participatory design methods and comparative analyses across geographical and governance contexts. This will help build a more robust foundation for the theory and practice of design for climate policy. Ultimately, this paper lays the groundwork for future collaborations between design practitioners and climate policy experts, as further research will enable a more practical and contextual understanding of design's role in this critical domain of public policy making.

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MEMORY AND TEMPORALITIES IN HERITAGE SPACES: MANAGING PUBLIC DESIGN IN HOUSE-MUSEUMS.

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ABSTRACT | This article explores the preservation and management of memory in heritage spaces, focusing on house museums. It examines how design and preservation decisions influence public interactions with history and culture. Central to this investigation is the concept of "memory maintenance," which considers how maintenance strategies and their temporalities shape design and public engagement. Drawing on theoretical frameworks such as artifact-maintainer associations, temporal enactments, and care ethics, the study highlights how memory is curated as either a "performance" (e.g., cinematic settings) or a "display" (e.g., events disconnected from historical origins). The analysis addresses the value dynamics emergent from maintenance and design practices. It reveals differences in how various areas of heritage sites are cared for: some spaces are maintained for temporary events, while others are meticulously preserved to reflect historical authenticity or align with curated narratives. These decisions not only affect the physical state of heritage sites but also shape the narratives presented to the public, influencing how visitors engage with and interpret history.

The case study of Villa Necchi Campiglio, a 1935 house museum in Milan, is a key example. The Villa's maintenance practices demonstrate the intersection of historical preservation and contemporary design choices. Some areas are carefully restored to evoke the Villa's original identity, creating an immersive experience of historical authenticity. Others are adapted for modern usage, such as hosting events that cater to current cultural and social needs. This duality illustrates the complexity of balancing the past with the present in heritage management. The study emphasizes the broader implications of these practices for public governance and leadership of cultural heritage institutions in the management of shared

historical narratives. By coupling the temporal to the ethical dimensions of maintenance and design, the article argues that institutions must navigate the tension between preserving historical authenticity and meeting contemporary community needs. Accordingly, the effective leadership and governance of heritage spaces require an acknowledgment of these competing demands, ensuring that cultural preservation remains relevant and accessible to diverse audiences.

In conclusion, this article underscores the significance of "memory maintenance" as a lens for understanding heritage management. It advocates a thoughtful balance between preserving historical narratives and addressing present-day social and cultural needs. By doing so, heritage institutions can foster a deeper connection between the public and the spaces they inhabit, ensuring that cultural memory remains a living and evolving entity.

KEYWORDS | MEMORY, CARE, HOUSE-MUSEUMS, MAINTENANCE, DESIGN

1. Introduction

As many countries in Europe and globally reassess their relationship with cultural heritage, the management of house museums has gained renewed relevance and significance (Young, 2007), going beyond merely conserving artifacts to serve as custodians of the intangible legacies of lifestyles, traditions, and domestic spaces. Accordingly, maintenance is receiving increasing relevance and attention from both academics and practitioners.

In line with Shannon Mattern's (2018) perspective, maintenance is not simply a technical practice, but a vital operation that ensures the longevity and functionality of spaces and infrastructures, while ascribing a profound social and cultural role to them. This paper explores how maintenance practices in house museums shape and transform our engagement with cultural heritage. Through the adoption of theoretical lenses of care studies (Tronto, 1993) and maintenance studies (Jackson, 2014; Pontille & Denis, 2022), we argue that these practices extend beyond the scope of material preservation to embody processes of active care, thus influencing how history is curated and experienced. From this vantage point, maintenance is positioned as a dynamic social practice that constructs meanings, fosters identities, and facilitates relationships with heritage. Accordingly, adopting this perspective on maintenance promotes an inclusive and evolving vision of the past, aligning it with the needs and realities of contemporary contexts.

The case considered in this study, Villa Necchi Campiglio, is a noteworthy historic residence located in Milan, Italy, built in the 1930s on commission by the Necchi family, one of the most influential bourgeois families of the time. Designed by the architect Piero Portaluppi, the Villa perfectly exemplifies the Italian Rationalist style. Its sober and functional aesthetic reflects the elegance and good taste of the "Milanese" bourgeoisie during that period. The Villa spans four floors and is surrounded by a large garden adorned with centuries-old trees, fountains, and meticulously maintained green spaces. Inside, the rooms are decorated with fine furniture and valuable artworks, which testify to the era's taste and culture while maintaining practicality. One of the Villa's distinctive features is its large swimming pool, a symbol of elegance, luxury, and leisure typical of bourgeois residences in Milan.

Villa Necchi Campiglio is not only an architectural landmark but also a performative "repository of history" (Battaglia et al., 2020; Cobb et al., 2020). Accordingly, while preserving memories related to the social and economic life of 20th-century Italy, since 2001, the Villa has been transformed into a museum, managed by FAI (Fondo Ambiente Italiano), with the aim of also promoting the cultural and artistic heritage of the Necchi family and the period in which the Villa was built. Furthermore, nowadays, it is a highly appreciated tourist destination, where visitors can admire the architecture and furnishings while immersing themselves in the authentic atmosphere of the past.

2. Background and motivations

In recent years, the debate surrounding house museums has seen significant contributions from global institutions such as the International Council of Museums (ICOM, 2024), through its International Committee for Historic House Museums (DEMHIST, 2024), as well as country-specific organizations like the National Trust for Historic Preservation in the United States (2024). In particular, DEMHIST has facilitated the exchange of best practices for managing house museums, emphasizing the importance of preserving the connection between the historical identity of the residence and the visitor experience, thereby transforming house museums into

spaces of living memory. Furthermore, for example, in the United States, the National Trust for Historic Preservation has promoted house museums as narrative spaces where personal stories are intertwined with national history, encouraging emotional engagement. This ongoing dialogue has enriched the global understanding of house museums as dynamic, interactive sites of memory.

2.1. Memory, space, and temporality in house museums

Memory, space, and temporality in house museums are fundamental components that define their cultural and historical value. In a house museum, time and space become tools for managing memory, serving as expressions of a past that crystallizes within an intimate, domestic environment. Unlike traditional museums, where objects are often isolated from their original context, in house museums, objects and the furnishings arranged within the rooms remain connected to the design of the spaces and the stories of their inhabitants, evoking a temporality that oscillates between past and present (Brighenti & Kärrholm, 2019).

In summary, the unique nature of house museums offers the opportunity to understand the material component, which is continuously evolving, as well as the slow, multi-temporal processes that characterize these houses, creating an environment where time and space intertwine to generate new, meaningful experiences.

2.2. Maintenance studies, care, and house museums

Maintenance studies is a stream of research that, when applied to house museums, provides a dynamic approach to heritage management, emphasizing the importance of daily care in preserving both the material and immaterial dimensions of historic spaces. Jackson (2014) highlights that maintenance is a form of knowledge and care that goes beyond mere repair, fostering continuous renewal of the material world. This also reflects the need for ethical dimensions of maintenance through the lens of care studies (Tronto, 1993). As to these issues, Pontille and Denis (2022) argue that maintenance is an act of care that preserves intangible values and practices. At the same time, Assmann and Czaplicka (1995) describe cultural memory as an active construction process that requires nurturing historical narratives and practices, transforming approaches to exhibition design and interaction with the public (see also Borsotti, 2017). As to this issue, a study by Xu et al. (2024) focuses on the immaterial aspects of maintenance as a practice that safeguards the invisible elements of a place: its meanings, memories, and the experiences it represents.

The study presented in this paper aims to address existing gaps in the study of house museums by integrating perspectives from maintenance studies, design practices, and the temporality of heritage. In particular, it seeks to understand how cultural institutions manage the balance between the historical preservation of heritage and the contemporary needs of communities.

3. Research Method

The study adopts as a theoretical stance the “constitutive entanglement of the social and material in everyday life” (Orlikowski, 2007, p. 1435) through the concept of *sociomateriality*, mainly referring to streams of studies that see organizations, actors, artifacts, and technologies as an emergent and “mutually dependent ensemble” (Orlikowski & Scott, 2008, p. 433). Accordingly, sociomateriality is “the space where human (social) agencies and material agencies are intertwined” (Leonardi, 2012).

In this context, the study considers material ordering and the care of things (Denis & Pontille, 2015), the various associations between artifacts-maintainers (Latour, 1984), and the different temporalities they enact (Barad, 2014) through the theoretical lens of *agential realism* (Barad, 2007). According to this perspective, Barad (2003, p. 815) states that "phenomena are the ontological inseparability of agentially intra-acting 'components'" or "relations without preexisting relata" (Barad, 2003, p. 815). The concept of "intra-action" does not presume the preexistence of the entities involved in a given interaction but rather a material configuration of the observation *apparatus*, which enacts an "agential cut," meaning "a local resolution within the phenomenon of the inherent ontological indeterminacy" (Barad, 2003, p. 815).

Taking this theoretical background into account, relevant for the discussion of the results, the study is nonetheless an inductive qualitative research based on data from the Villa Necchi Campiglio case study (Eisenhardt, 1989; Eisenhardt & Ott, 2017; Gioia et al., 2013; Glaser & Strauss, 1967).

The investigators conducted a preliminary study in 2022 on the Villa Necchi Campiglio house-museum in Milan, Italy, designed by architect Piero Portaluppi in 1935 for the Necchi Campiglio family, part of Milan's affluent bourgeois industrial class of the 1930s. The study was based on an initial analysis of the house museum's historical documents and aspects related to the site's maintenance, followed by an initial set of four interviews with the Villa manager, the lead architect, the Villa keeper, and the lead gardener. The informants made up the core permanent staff selected through theoretical sampling (Glaser, 1978, 1992, 2005; Holton & Walsh, 2017; Shepherd & Suddaby, 2016; Suddaby, 2006).

Accordingly, the primary data used in the early stages of the study presented in this paper are audio recordings of interviews (average length forty minutes) and the investigators' notes, together with secondary data from publicly available online sources, such as news, magazine articles, podcasts, etc. Data analysis follows the coding steps in classical grounded theory: open coding, selective coding, and theoretical coding (Glaser, 1978, 1992, 2005; Holton & Walsh, 2017).

4. Results

At Villa Necchi Campiglio, maintenance emerges not only as an exclusively technical practice aimed at the conservation of historical objects but as an active process of production and transmission of cultural meanings. The analysis of the data allows to ascertain how certain representations of memory are curated compared to others, enacting the way in which cultural heritage is experienced and interpreted by visitors. Maintenance activities are managed and understood as spaces that do not simply preserve historical objects but that produce and transmit cultural meanings. The analysis grounded on the data collected at the Villa Necchi Campiglio leads to an early theorizing around the central concept of "memory maintenance," subsuming how maintenance strategies and their temporalities shape design and public engagement. Accordingly, the "memory maintenance" at the Villa Necchi Campiglio points out a set of temporalities enacted in the heritage spaces, which are the temporal stratifications linking the past to the present and impact the leadership of the Villa management for decisions about conservation, exhibition, and communication to the public.

In particular, the management and design choices of spaces are the expression of a complex balance between the need to preserve a historical legacy and the need to make this heritage relevant for contemporary communities. For example, Villa Necchi Campiglio in 2009 became the film set for Guadagnino's film "I Am Love," chosen as the scenery for the upper-middle-class protagonists of the film, and later for the 2021 movie "House of Gucci," directed by Ridley Scott,

about the Italian fashion brand family. For these occasions, maintenance activities required an additional effort to secure not only the architecture but also the objects and furniture of the Villa, while the choices of the fittings highlighted certain parts of the Villa, such as the swimming pool, and omitted others, such as the service rooms. In this sense, the maintenance choices are not neutral but actively participate in the construction of narratives that enact various and alternative space-time configurations, shaping the way in which the museum interacts with memory, the public, and the social context. As to this issue, the data analysis allows for the identification of a set of time configurations enacted in the Villa's spaces that aim at the "maintenance of memory": *Present "Perfect," Present "Continuous," Past "Perfect,"* and *Future "Imperative"*.

The actual exhibition of the original furniture and artworks constitutes the present framework of the historical past of the Villa, whose memory is kept alive through maintenance activities. Thus, the spaces that hosted activities in the past are nowadays presented as they used to be. In this case, the present hosts the past through its art, sense of beauty, and taste (so, a *Present "Perfect"*). In general, this is the time-space configuration of the house as a museum.

Then, some of the Villa environments are used for special events like the ones of the Salone del Mobile annual fair of design and furniture in Milan (see, e.g., Todd, 2022). This time configuration points out the enactment of the Villa as a space for action and activities that are happening nowadays and eventually will continue to happen, like being a venue for an event or similar other events occurring yearly (so a *Present "Continuous"*).

Another time-space configuration is enacted by the use of the Villa as a filming location for stories that are set in alternative (past) times to the current one or even to the history of the Villa, although connected to its actual historical profile ("All of these luxurious, modern features made the Villa one of the iconic residences of the period," FAI, 2024). So, this configuration enacts a "*Past*" that is *"Perfect"* not only at a (linear) time level but also adapted to different (hi)stories, nonetheless translating and complying with the present "perfect" in terms of its art, sense of beauty, and taste.

Finally, there is a time-space configuration concerned with the plans for the future development of the Villa, for example, as a garden further extending the original flora of the Villa (so, a *Future "Imperative"*).

5. Discussion

The study's preliminary results provide a situated understanding of the multiple temporal configurations that emerge in spaces dedicated to the "memory maintenance," examining how these different temporalities are interwoven, kept separate, or hierarchized. This process also reveals how science and technology (e.g., in film settings) intervene in the materiality of the associations between various artifacts and their maintainers in the care and appropriation of spatial-temporal representations. Also, these associations are characterized by *attention* to the *fragility* of the artifacts maintained in the different space-time configurations (with a parallel to the attentive care that is paid by maintainers of airplane wings and engines, as pointed out by one of the informants who had experience in both types of maintenance).

In particular, the research highlights the diverse associations between artifacts, maintainers, and exhibitions that shape the representations and configurations of the house's enacted time (*Present "Perfect," Present "Continuous," Past "Perfect,"* and *Future "Imperative"*) that have evolved through ongoing maintenance work over the years. Specifically, these associations

provide insights into the potential benefits and design challenges in the museum's spatial planning, organization, and upkeep, which are essential for conveying cultural, historical, and social meanings.

How does the multiplicity of times unfold in the specific maintenance settings? How are these different times combined, kept separate, or hierarchized? What tensions and confrontations arise from their coexistence? How are maintenance times (and, above all, the time of the materials from which things are made) lived, measured, and/or organized? What types of design are involved in these processes? What kinds of knowledge are developed regarding the rhythms of maintenance and the temporalities of matter? As to these questions, Villa Necchi Campiglio represents the "time of the bourgeoisie," with design choices that have shaped this historic residence, a symbol of bourgeois prosperity in the 20th century. However, at present, Villa Necchi Campiglio experiences a period of continuous updating and transformation, with the Salone del Mobile held annually and film sets bringing renewed attention to the beauty of the Villa's interior spaces. Here, architecture and design are tools that reflect not only the material heritage but also how these spaces can be lived in a sustainable manner without losing their authenticity.

Looking to the future, the design choices of the Villa's caretakers aim to preserve the beauty of the expansive outdoor garden through a conscious and respectful approach, where attention to the fragility of the environments requires ongoing care. This led, for example, to the creation of the project *Un ambiente per l'Ambiente* ("An environment for the Environment"), an immersive installation open to the public for free (NEO, 2022), located in the original garage of the Villa. The installation narrates the relationship between nature and history at the heart of the city. The project aims to promote a holistic vision that integrates design, maintenance, and sustainability to ensure heritage preservation for future generations.

6. Conclusion

This working paper addresses the complex dynamics of cultural heritage, with a particular focus on house museums and the case of Villa Necchi Campiglio in Milan, Italy. European societies are nowadays facing the challenge of reflecting on the implications of how historical narratives are constructed and preserved. By placing a strong emphasis on the maintenance and care of these spaces, the aim is to highlight not only their role in conserving objects but also how they contribute to cultivating and safeguarding the heritage of collective memory. Thus, house museums are not simply custodians of objects; they are vital spaces where the stories of people and cultures intertwine, offering opportunities for meaningful and engaging experiences while fostering an active dialogue between past and present within communities. By analyzing maintenance design practices, we uncover how they are intrinsically connected to the care of heritage and how they contribute to defining the historical identity of these places. Daily maintenance activities not only preserve the materiality of the spaces but also play a crucial role in constructing meaningful experiences for visitors.

As to this issue, the research presented in this paper has discussed the unfolding of multiple-time configurations enacted in spaces that aim at "memory maintenance" and how the intra-acting in these different times are combined, kept apart, or hierarchized, on the one hand, in the materiality of the associations of the diverse artifacts-maintainers, on the other hand, in the appropriation of spaces-time representations that enact the maintained-house museum.

The outcomes of this research aim to provide practical tools for cultural heritage professionals, guiding reflection on how maintenance practices can influence the perception of memory within house museums. Emphasizing the importance of everyday care in preserving both the material

and immaterial aspects of these spaces, the research presented in this paper intends to expand the understanding of their role as active sites of memory. Accordingly, effective leadership and governance of heritage spaces require an acknowledgment of the competing demands associated with different time-space configurations, ensuring that cultural preservation remains relevant and accessible to diverse audiences.

In conclusion, this article underscores the significance of "memory maintenance" as a lens for understanding heritage management for effective leadership and governance of heritage spaces. Moreover, the paper aims to create a critical and informed dialogue on the preservation of memory within house museums. Although preliminary, the results aim to offer practical tools for cultural heritage professionals to develop a governance model that balances historic preservation while promoting a collaborative and multidisciplinary approach. Through engagement with both the academic community and practitioners, we aim to foster a more nuanced understanding of how maintenance, care, and memory intertwine in these unique heritage spaces.

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OSMOSI RESEARCH PROJECT: A MAPPING PROCESS FOR SOCIO-CULTURAL HYBRID SPACES.

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ABSTRACT | This paper presents the initial outcomes of *OSMOSI*, an action-research project investigating socio-cultural hybrid spaces in Italy, with a specific focus on the regions of Lombardy and Sicily. The project aims to assess the impact of these spaces in terms of social innovation, economic sustainability, and the built environment, through a series of research actions. Adopting a design-driven mapping approach, outlined in this paper, the study combines desk research, surveys, and interviews. Through this methodology, 80 hybrid spaces were identified across Lombardy and Sicily. The analysis focuses on their identity, operational context, management model, economic model, and spatial quality. The paper first introduces the OSMOSI project and explores the concept of socio-cultural hybrid space, defined as a place of urban experimentation and social inclusion enabled by creative and cultural activities. It then details the development of the mapping process and the criteria adopted for the selection of the spaces under study. Preliminary findings from the mapping process are also presented, including accessibility as a key issue, the identification of primary and secondary functions, and the geographical distribution of the spaces. This study is intended to serve as a valuable resource for scholars engaged in investigating these multifaceted interactions, providing a framework for analysing socio-cultural hybrid spaces across varied urban contexts.

KEYWORDS | CULTURAL HYBRID SPACES, URBAN REGENERATION, DESIGN FOR SOCIAL INNOVATION

1. Hybrid Spaces as incubators for urban experimentation and social inclusion

The ongoing transformation of urban spaces has become an essential part of addressing the challenges cities face in the 21st century. The Italian context reveals a significant shift in the use and function of public spaces in urban areas. According to the Italian Ministry of Economy and Finance, approximately 10% of Italy's public real estate is currently unused, a situation exacerbated by the effects of digitalisation and the consequences of the COVID-19 pandemic (Diana et al., 2022). This trend has led to the growing "de-functionalisation" of public interiors—previously vibrant civic spaces that are now underutilised, such as government buildings, educational institutions, and cultural centres (Pimlott, 2018). As cities evolve, there is an urgent need to rethink how these spaces can be revitalised and repurposed. The regeneration of these disused areas has the potential to foster social inclusion, economic sustainability, and urban renewal, making them key assets for community development.

In this context, hybrid spaces have emerged as a powerful tool for urban regeneration. They are not only a phenomenon limited to public interiors; former industrial buildings, farmsteads, kindergartens, churches, movie theatres, offices, gatehouses, and markets are among the places they frequently revitalise and reactivate (Inti et al., 2021), emphasising cultural aspects. In recent years, they have grown in a number of European cities. For example, the municipality of Amsterdam maintains a desk that handles the online mapping of abandoned areas under municipal ownership. These areas are given to associations, organisations, and socio-cultural entrepreneurs. Recently, Berlin has seen several bottom-up movements to reclaim abandoned spaces or buildings, which have regenerated local economies with a focus on solidarity-based welfare (Trapanese & Mariotti, 2022). Hybrid spaces address the physical transformation of cities and serve as dynamic hubs that foster social interaction, community empowerment, and cultural exchange. These spaces often emerge in response to urban fragmentation and social exclusion, acting as incubators for creative practices and social experimentation (Manzini, 2021). Characterised by their multifunctional and adaptive nature, they blend cultural, social, and economic dimensions and provide fertile ground for innovation and social cohesion (Krasilnikova & Klimov, 2020).

OSMOSI is an action-research project that seeks to explore the impact of socio-cultural hybrid spaces in Italy, focusing specifically on the regions of Lombardy and Sicily. Coordinated by the Polimi DESIS Lab Research Group within the Department of Design at Politecnico di Milano, and the co-coordinated by the University of Palermo through its Department of Architecture. Additional contributions come from the Department of Architecture, Built Environment and Construction Engineering and the Department of Management Engineering at the Politecnico di Milano, as well as the Pedagogical and Psychological Department at the University of Palermo.

The research is supported by two key hybrid spaces located in the two regions under analysis: BASE Milano, in Lombardy, and Farm Cultural Park, in Sicily. The project aims to contribute to the expanding body of knowledge on the impact of cultural hybrid spaces, offering a framework for their development and replication in other urban settings. Ultimately, the goal is to establish a model that can guide public administrations and other stakeholders in creating new cultural hybrid spaces that are socially, economically, and environmentally sustainable.

This paper provides a detailed review of the initial phase of the OSMOSI project, focusing on the process of mapping these hybrid spaces. The goal of this paper is to provide a protocol for design-drive mapping of socio-cultural hybrid spaces through a set of exploratory and survey tools. The paper outlines the structure of this process and presents preliminary findings, which will inform the next phases of the research.

2. Defining Hybrid Spaces socio-culturally based

Hybrid spaces serve as bridges between evolving social dynamics and cultural practices. The concept of hybrid spaces in urban contexts refers to many existences that inhabit the city. These spaces consequently act as points of reference for such multiplicities. They are cultural institutions in the city that do not merely respond to the needs of local communities but are also shaped by urban regeneration processes and the ethical and political transformations of culture (Lo Stato dei Luoghi et al., 2024, p. 28). The Stato dei Luoghi is Italy's first network of culturally based hybrid spaces. It unites groups and individuals dedicated to reviving metropolitan areas via cultural revitalisation. For the past few years, the network has been conducting a definition process to identify and classify spaces that fit the definition of a "socio-cultural hybrid space."

These spaces are characterised by:

- **A strong cultural identity:** Addressing contemporary themes through art and culture, including residencies, public art, festivals, exhibitions, seminars, theatre, concerts, community-led cultural projects and launches.
- **Multifunctionality:** Combining cultural activities with other sectors. Unlike traditional cultural spaces, these places integrate multiple uses.
- **Plural audience and activities:** Encourage interaction between different communities and combine cultural production, participation and aggregation with social engagement.
- **New models of decision-making and co-creation:** Emphasising participatory governance and artistic collaboration as tools for social and civic innovation.
- **Innovative economic sustainability strategies:** create opportunities for youth entrepreneurship and cultural and creative industries by exploiting the multifunctional nature of these spaces.
- **A role in social cohesion and inclusion:** actively contributing to stronger, more connected local communities.

As previously stated, a primary characteristic of these spaces is their multifunctionality; they are no longer merely spaces for exhibitions or performances but rather dynamic ecosystems where multiple fields intersect, ranging from professional training to social engagement, from social innovation to artistic research. The socio-cultural hybrid space is defined by its integration of multiple functions, thereby attracting a diverse audience and facilitating interactions between individuals who would otherwise never have had the opportunity to meet. It is therefore recommended that socio-cultural hybrid spaces prioritise the 'unexpected person' rather than exclusively targeting the typical audience (BASE, 2023).

As emphasised in the BASE Milano Manifesto, plurality in socio-cultural hybrid spaces is not confined to the diversity of a cultural programme; it encompasses a re-definition of power structures, governance models, and decision-making processes. The concept of plurality, therefore, is translated into the ability to "make space" for communities and individuals who have been traditionally excluded from public arenas, thereby fostering co-curation pathways and active listening practices. The diversity of activities and services that characterise socio-cultural hybrid spaces present challenges on a physical level. As a space that fosters plurality and consequently serves minorities, hybrid cultural spaces must ensure accessibility in terms of cultural production and spatial distribution. This necessitates the creation of environments that are physically, sensorially and cognitively inclusive, ensuring that individuals of diverse abilities and backgrounds can fully engage in cultural activities without encountering barriers or exclusions. In this sense, accessibility cannot be regarded as a mere technical requirement but rather as a political design that redefines the very notion of public space.

3. The mapping process for socio-cultural Hybrid Spaces

3.1 Mapping as a tool for recognition and implementation

Mapping hybrid spaces is crucial for recognising their impact on cities and communities and understanding their role in urban and social transformation. Additionally, mapping facilitates the creation of networks that promote collaboration and resource-sharing among hybrid spaces, strengthening their collective impact. This process also provides public administrations and stakeholders with valuable data to design policies and strategies that support the development of new cultural hybrid spaces.

The need to map them has emerged through two key initiatives: an Italian national-level survey, which collected data on 845 cultural spaces across Italy, and a city-level initiative in Milan, which documented 26 local spaces.

The first initiative is the Call to Action, which was launched by “cheFare”, an agency for bottom-up cultural transformation. Between February 2020 and

December 2021, cheFare collected data on 845 hybrid spaces nationwide through an open public survey. The initiative aimed to capture the spread and characteristics of new cultural centres by gathering reports from space managers, operators, and visitors. While the data is not entirely objective - relying on voluntary self-reporting - it provides a valuable first snapshot of a growing national phenomenon. The mapping highlights the widespread presence of hybrid cultural spaces and their impact on local communities. As reported in the results document, more than a definitive study, this initiative is a starting point for further research, encouraging universities, networks, and public institutions to engage in more detailed and structured investigations.

The second initiative is part of creating the "Hybrid Spaces Network" in Milan and includes the Socio-cultural Hybrid Spaces survey conducted in 2021, which involved 26 Milanese entities. The survey produced a geographical map of these entities and collected data on their legal status, space typology and ownership, types of activities, and involved actors. As the Director of the Urban Economy, Fashion, and Design Project Department at the Municipality of Milan, clarified during an interview for the OSMOSI project, this initiative "was not merely a mapping exercise but rather an urban policy aimed at identifying and supporting de-functionalised spaces.". It resulted from a bottom-up process initiated by a group of hybrid spaces. This collective effort produced a document outlining their characteristics and their role as privately managed yet publicly relevant spaces. Moreover, this document also included their requests to the municipality for official recognition and the development of policies suited to their specific form.

The OSMOSI mapping aims to provide a detailed overview of socio-cultural hybrid spaces in Sicily and Lombardy, considering their environmental and socio-economic contexts, and to contribute to the comprehensive framework that can guide public administrations and stakeholders in supporting and developing new cultural hybrid spaces. The mapping follows a design-driven approach to data collection, ensuring it creates a comprehensive and contextualised representation of hybrid spaces while demonstrating its potential for replication in other contexts.

The mapping process was developed through a mixed-method approach, combining desk research, surveys, in-depth interviews, and follow-up activities. This methodology aimed to comprehensively understand hybrid spaces by integrating quantitative and qualitative data. The survey was delivered to 80 spaces (62 in Lombardy region and 18 in Sicily region). It was designed as the core data collection tool and it was structured into eight sections, each exploring different dimensions of hybrid spaces. To ensure the survey's effectiveness and relevance, it was developed through an iterative process (Figure 1) involving multiple phases of testing and refinement. Initially, in-depth interviews were conducted with professionals in the field and with the support network of BASE Milano (in the Lombardy region) and Farm Cultural Park (in the Sicily region). These interviews and a literature review aimed to identify key indicators that would later shape the questionnaire, ensuring its alignment with the real needs and characteristics of hybrid spaces. Once the preliminary version of the survey

was developed, it was tested with the representatives of BASE Milano and Farm Cultural Park and refined to better capture the complexity of these spaces.

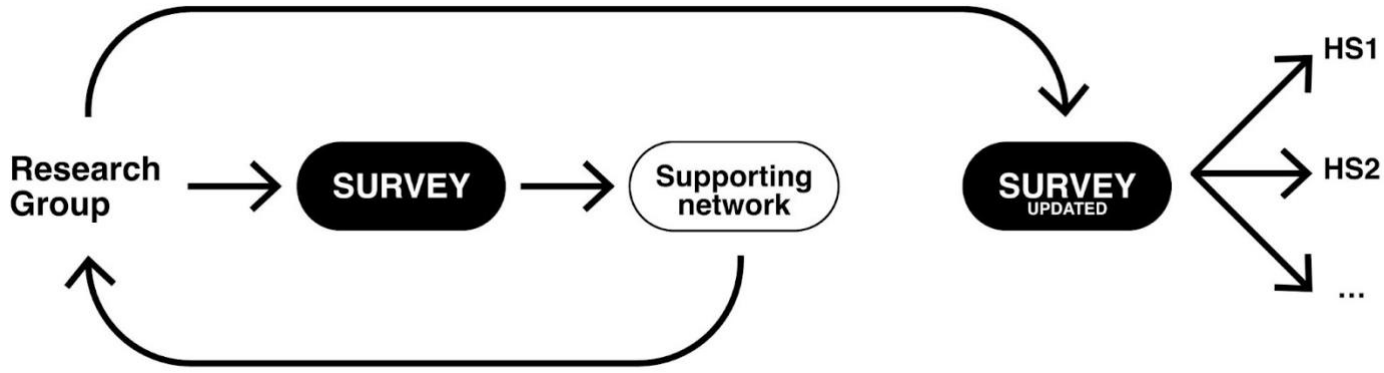

Figure 1. Graphical visualisation of the iterative process used for the survey ideation.

1.2 Mapping indicators for assessing the Social, Economic, and Environmental Impact

Identifying indicators for measuring the social, economic, and environmental impact of the socio-cultural hybrid spaces requires a theoretical framework considering these dimensions' interconnected nature. The questionnaire used for the mapping was based on the three dimensions of sustainability (Social, Economic, and Environmental) and an Identity Profile of the space, which serves as an overview of each space.

This tool offers a flexible approach to capturing the multifaceted nature of these spaces. The Identity Profile covers history, mission, and integration into the socioeconomic and urban context, helping assess how these spaces emerge and interact with their surroundings (Manzini, 2015). Social innovation focuses on the people and activities that shape them, including value propositions, openness, and participatory activities, aligning with co-creation and participatory urbanism theories. Social sustainability is linked to equity, cultural accessibility, and community engagement, emphasising network creation and participation (Dempsey et al., 2011). Economic sustainability examines funding and governance models, highlighting the diversified financial resources sustaining these spaces. Finally, environmental sustainability looks at the spatial configuration and environmental impact, assessing aspects like thermal, acoustic, and visual comfort, which align with research on sustainable architecture and adaptive reuse (Bullen & Love, 2011). Combining them is necessary because sustainability is not a static condition but a dynamic process that evolves based on contextual, cultural, and institutional factors (Folke et al., 2005). The result is an online questionnaire comprising 8 sections and 46 questions, with closed and open-ended responses.

Below are the sections with the main topics of the questions:

1. **Contact Information** (Full name, role within the organisation, email address)
2. **Identity and History of the Space** (Name, location, self-definition, founding year and initial conditions, promoters, legal status, affiliated organisations, ownership of the space)
3. **Size and Context** (Square meters, number of staff and visitors, geographical context, nearby similar spaces)
4. **Value Proposal** (Vision, mission, social innovation as outcome)
5. **People and Content** (Collaboration network, target audience, main activities and functions, participation, and community engagement)
6. **Accessibility** (Physical barriers, sensory and cognitive accessibility, plural communication, economic accessibility)
7. **Resources and Management** (Revenue sources, turnover, net income, amount of public/private funding, relationships with public administration)
8. **Built Environment** (Floor plan, spatial performance, acoustic, thermal, and visual comfort)

4. Insights and findings from the iterative mapping process

The iterative design-driven approach adopted for the development of the questionnaire has already produced significant insights, some of which are summarised in this section.

One of the key outcomes of this process was identifying a critical gap in the original survey framework: the need for a dedicated section on accessibility. Inspired by the principles of Un'IDEA Manifesto by BASE Milano, this section was integrated into the questionnaire to provide a more holistic perspective on accessibility. It expands the analysis beyond physical and cognitive aspects to include economic, gender, and cultural inclusivity, reflecting socio-cultural hybrid spaces' diverse and evolving nature.
Defining the spaces to be mapped requires first establishing a shared definition of hybrid spaces among the researchers and the partners. As mentioned before, a key reference in this regard was "Ibridazione: nuove politiche per la rigenerazione culturale dei luoghi [Hybridization: New Policies for the Cultural Regeneration of Places]", a project by "Lo Stato dei Luoghi" in collaboration with the "Direzione Generale Creatività Contemporanea" of the Ministry of Culture and the "U-Rise" Master's Program at IUAV University of Venice. Building on this framework, along with insights from literature and interviews, we developed the definition of an "osmotic space" to guide the selection process. That meant that we looked at spaces with these characteristics: spaces formerly used for a different purpose before being regenerated and assigned a new function, spaces that host activities spanning multiple functions, and at least one of these functions is of a cultural nature. Another key factor in the selection process was the permeability of the spaces - specifically, how accessible they are to the general public. This aspect was assessed by considering whether entry required payment, consumption, or membership, leading to a nuanced classification of different levels of permeability.

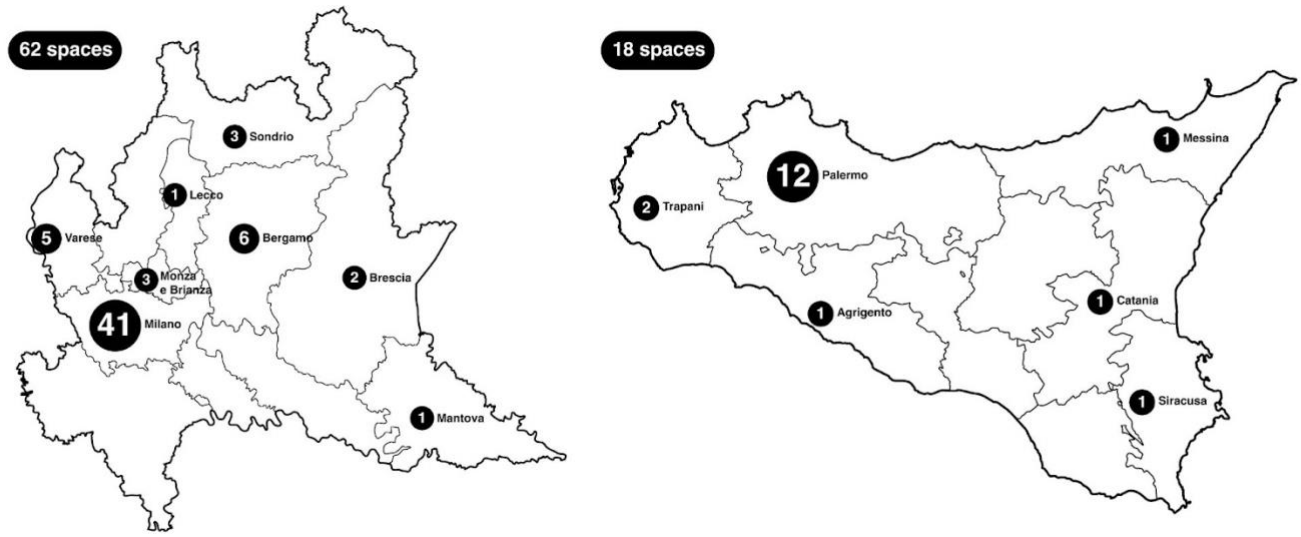

Figure 2. Graphic visualisation of the distribution of socio-cultural hybrid spaces in Lombardy and Sicily regions.

Figure 3. Graphic visualisation of the distribution of socio-cultural hybrid spaces in the city of Milano (Lombardy region).

As shown in Figures 2, we have identified 62 spaces in Lombardy and 18 spaces in Sicily, the majority of which are located in the regional capitals, highlighting how the phenomenon is predominantly concentrated in large urban centres, particularly in the peripheral neighbourhoods of these cities. In Figure 3, we can see that in the city of Milan, some clusters can be identified: a cluster in the northern area, a cluster in the north-eastern area and a cluster in the southern area of the city.

However, the phenomenon is also emerging in more remote and rural areas, a development that reflects the broader role of socio-cultural hybrid spaces in revitalising not only urban areas but also peripheral and rural contexts, where they contribute to processes of regeneration, inclusion, and innovation (Ostanel, 2017). As new spaces are established, the list remains open-ended, underscoring this phenomenon's dynamic and evolving nature.

From an initial overview derived from the desk research, which will later be confirmed by analysing the mapping results of the 62 socio-cultural hybrid spaces in Lombardy, primary functions and secondary functions attributable to the socio-cultural hybrid spaces being mapped were defined. The correlations between the different spaces and the primary and secondary functions can be appreciated in Figures 4. An initial analysis of these correlations shows that the

functions most frequently performed by the spaces (associating both primary and secondary functions) are those of cultural talks, workshops, musical events, restaurants, art exhibitions and formation courses.

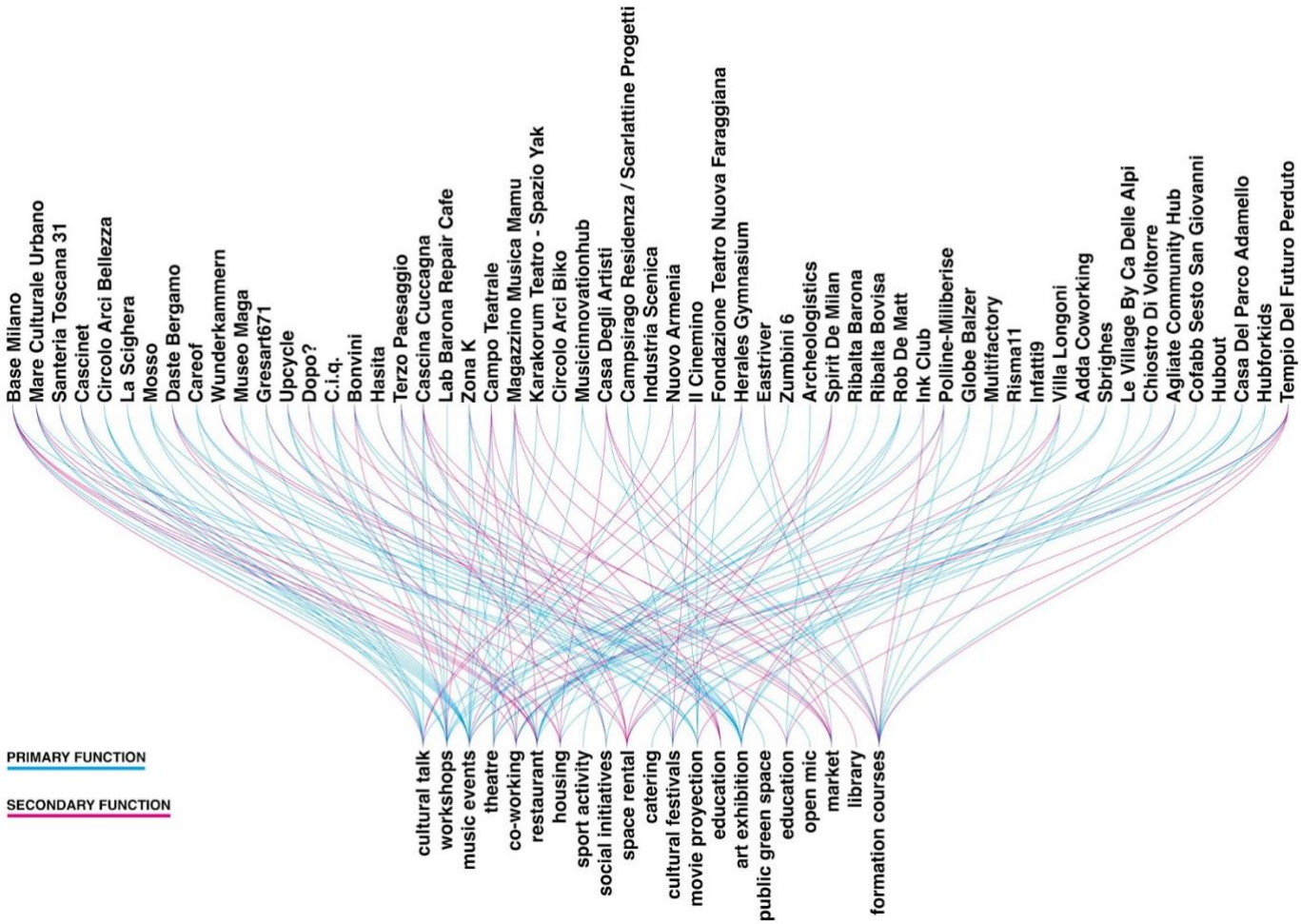

Figure 4. Graphic visualisation of primary and secondary functions concerning the mapped spaces in the Lombardy region. Socio-cultural hybrid spaces (in the upper part) and functions (in the lower part).

5. Conclusions

This study presents a few limitations: each socio-cultural hybrid space is characterised by a high degree of specificity, making it difficult to formulate generalisations. Additionally, since the mapping activity is constrained by the project's timeframe, and new hybrid spaces continue to emerge, some may not be included in the current sample. Furthermore, the two regions under investigation —Lombardy and Sicily—are marked by very different socio-cultural, economic, and administrative conditions. These contextual differences significantly influence the analysis and require nuanced interpretation of the results. The choice of Lombardy and Sicily reflects an intention to explore diversified scenarios, and future studies could extend this mapping model and protocol to other Italian regions, as well as to international contexts, to further test its applicability and relevance.

The paper reflects the emerging ethics of public design through the structure of the 'questionnaire' tool, which integrates multiple dimensions of accessibility in its various sections. Specifically, it includes questions related to:

- Plural language that uses inclusive communication modes that guarantee representation and comprehensibility for different identities and sensitivities through the adoption of different linguistic strategies, the avoidance of exclusionary or stereotyped terms or expressions, and the creation of a communication that enhances all people through assisted reading tools.
- Cultural accessibility is based on the commitment to guarantee the right of access, participation and involvement in cultural life for all persons, regardless of their physical, sensory, intellectual, psychic or communicative characteristics. Cultural accessibility is a continuous learning process that requires people's involvement and implies the construction of spaces of expression and self-narrative that enable communities to bring about social transformation.
- Physical accessibility is achieved by designing safe, inclusive, and barrier-free cultural spaces, ensuring barrier-free spaces for people with mobility impairments, eliminating sensory barriers, and creating flexible and adaptable environments that can be easily identified.

Different roles of the designer emerge from the paper. In fact, the designer can act as:

- Facilitator and thus able to guide and support the processes of co-creation, collaboration and innovation within research activities. His or her role facilitates decision-making and research processes, ensuring that the activity realised (the questionnaire discussed) is effective, user-centred and achievable.
- Tool designer who does not directly create final solutions but develops tools, methodologies and frameworks that enable stakeholders to effectively perform or co-design the required activities, thus acting as an enabler of innovation.
- Process designer who structures the sequences of activities, interactions and decisions that define the realisation of the activity, pursuing the goal of making processes more efficient, intuitive and capable of generating value for all stakeholders involved.

The importance of regenerating disused public spaces through cultural and creative enterprises has become increasingly recognised. As highlighted in Italy's National Recovery and Resilience Plan, there is a strong emphasis on transforming public spaces to serve social, cultural, and educational purposes. It advocates for implementing environmental criteria in the design and renovation of public buildings, which is also relevant to cultural spaces. Regenerating these spaces addresses the physical decay of urban environments and creates opportunities for social interaction and cultural exchange, reinforcing the notion that "culture heals" (Satta, 2023). Integrating environmental, social and economic considerations into the design and renovation of cultural spaces fulfils two key

objectives: preserving the physical integrity of urban environments and cultivating a strong sense of community.

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PLAY TOGETHER: Designing Parenting in Prison.

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ABSTRACT | The paper reports on a multidisciplinary research action that was set up in response to a university call for Third Mission projects.
The aim of the multidisciplinary project entitled "Fathers and Sons" is to improve the quality of time, however limited, that children spend with their parents in prison, by designing a physical and psychological meeting space for them.
Specifically, this multidisciplinary project, which brings together experts from the fields of architecture, psychology, humanities, theatre and law, is aimed at fathers in prison with children aged between 3 and 7. The work was divided into three distinct phases: 1) the analysis of the literature on parenting in prison and play; 2) the design phase of different types of toys; 3) the evaluation of the products created through workshops with inmate fathers of an Italian prison.
In particular, the role of design is to develop a series of toys designed on the basis of the existing literature on play and parenting in prison. In fact, play is not a mere recreational activity, intrinsically motivated and unfinished, but an essential element for the child's development and the establishment of healthy and functional relationships (Neale, 2020).
More specifically, studies investigating the links between play involving fathers and children suggest that play with fathers may contribute positively to children's social, emotional and cognitive outcomes (Amodia-Bidakowska et al., 2020).
The central element of parenthood is 'generativity', the ability to responsibly care for what has been generated, providing care and support to ensure psycho-affective maturation (Erickson, 1982). Becoming a parent is therefore an ongoing process that requires skills, knowledge and flexibility depending on the stage of life that parents and children are going through (Cassibba et al, 2008).
Being an imprisoned father therefore falls into the category of parenting at risk, as the condition of imprisonment makes some basic assumptions of parenting disappear (Sala & Zampieri, 2020; Dargis & Mitchell-Somoza, 2021). Indeed, imprisonment interrupts or

modifies the two-way and reciprocal nature of the communicative and interactive relationship between parent and child, and does not allow the parent to exercise physical,
L. Di Lucchio & G. Tempestini
spatial and temporal continuity.
This condition is becoming the object of attention and discussion by institutions and associations, which are increasingly promoting prevention and promotion processes aimed at ensuring that the detained person is able to cultivate relationships with their children in an appropriate and functional manner, with the secondary aim of also reducing the likelihood of recidivism and building a greater sense of social responsibility (Nardone, 2016).
Indeed, several authors have argued for the importance of thinking critically about the physical spaces and environments within correctional institutions, which are rarely designed to be child-friendly (e.g. Peterson et al., 2015; Arditti, 2008). However, few studies have explored how activities should be designed during the time that inmates and children have the opportunity to spend together. Using a co-design approach and participatory design tools, the research also helps to understand how design can play an active role within a multidisciplinary team to improve a more ethical management of social issues.

KEYWORDS | DESIGN FOR SOCIAL INNOVATION; PARENTAL FUNCTIONS; PLAY & RE-EDUCATION

1. Introduction

The world of design and the prison context seem to be two worlds that are apparently totally at odds: the former is focused on the search for beauty and the greatest possible comfort through creativity and innovation; the latter, on the other hand, is aimed at finding minimally functional solutions that allow those who have to live it to survive. The encounter between these two worlds has not been studied in the scientific literature, especially with respect to the improvement of certain aspects of prison life that seem to be, for the institutions, marginal. Despite this, it is important to reflect on how much the meeting of these two contexts can produce benefits at different levels: firstly, a benefit for the inmates who live their daily lives within the prison context, secondly for the people who work within it, for the inmates' families and for society as a whole who benefit from improving the inmates' lifestyle and from caring for certain spaces that they too have to share.

When this happens, design becomes a bridge between the 'inside' and the 'outside', in which the production of new skills, new stimuli, and new aspirations allows the 'outside' to understand how there is an 'inside' that should not be forgotten and that is part, albeit sometimes forgotten, of our society. The 'Play Together' project is part of a much broader initiative involving various departments of the Sapienza University of Rome, in which teachers, researchers and students from Architecture, Design, Psychology, Law, Humanities and Public Health collaborate. The interdisciplinarity of the professionals involved in this project has been a fundamental asset, allowing the issue of parenting in prison to be addressed from a broad and multifaceted perspective. The convergence of various areas of expertise made it possible to analyze every aspect of the issue, ensuring solutions that were not confined to a single field but could integrate effectively. This approach enabled not only the design of games aimed at facilitating the relationship between fathers and their children but also the redevelopment of spaces dedicated to family visits, making them more welcoming and functional. Moreover, collaboration among experts allowed for an in-depth study of the emotional and relational dynamics involved, identifying strategies to foster more spontaneous communication between parents and children, minimizing the constraints imposed by the prison environment. Psychologists contributed by developing activities to mitigate the emotional impact of prison visits on children, while designers focused on creating tools that could facilitate interaction and play in a setting that is often cold and inhibiting by nature. The legal framework was also taken into account to ensure that the proposed solutions were feasible and implementable within the prison system.

This process led to the creation of a structured and replicable intervention model, capable of adapting to different contexts and addressing the specific needs of the families involved. Based on the diverse professional expertise, a central objective was established: to enhance the physical and psychological well-being of incarcerated parents and their children by improving parenting skills. These skills could be tested through a range of activities, from the redevelopment of spaces for family interactions to the design and creation of games and stories for the children.

The work involved three distinct phases: 1) the analysis of literature on parenting in prison and play; 2) the design phase of different types of toys; 3) the evaluation of the products created through workshops with inmate fathers from an Italian prison.

2. Theoretical background: parenthood in prison

Being imprisoned fathers falls into the category of parentinġ at risk, as the condition of imprisonment makes certain basic prerequisites for the exercise of the parental function disappear (Sala & Zampieri, 2020). Prison life automatically interrupts and alters the two- way and reciprocal nature of the parent-child communicative and interactive relationship. An imprisoned father has difficulty in exercising the physical, spatial and temporal continuity that pertains to the role of parent. Thus, he is not in a position to guarantee the

transmission of trust and security to his son/daughter, which are fundamental for their growth. Although the custodial condition does not represent the only form of distant parenthood, it certainly represents the form of distance most marked, on a symbolic and factual level, by value judgements and attributions of merit. The problem, in this case, does not lie solely on the level of the father's distance, which may be physical but not necessarily psychological, but the question inevitably shifts to the reason why the father is distant and the daily absence of a figure essential to a child's development. Family detention can, in fact, alter family dynamics, generating in children a sense of responsibility for caring for adults in the family unit who are not detained (Leeson & Morgan, 2019). Research agrees that when a family member is detained, the harm to children is great (Condry & Minson, 2021). In addition to all that this entails in terms of the growth and development of the child

and the entire family unit, families experience the detention of the parent with a great sense of shame and a desire to keep the detention a secret, leading children to further isolation and the difficulty of having to answer questions about their father figure with suffering and discomfort (Payler et al., 2024). The challenges of the parental role in prison are, therefore, numerous (Dargis & Mitchell-Somoza, 2021). First and foremost, one challenge that needs to be addressed is that of interviews and contact arrangements between incarcerated parents and their children. Institutional policies, which increasingly emphasise the maintenance of family relationships, limit the frequency and quality of contact between detained parents and children. Even the modes of contact, although permitted, are restricted with respect to duration and the list of contacts that are approved and can be contacted. This aspect is closely linked to the issue of communication, which is characterised by very high barriers, such as the monitoring of calls and emails, limited visits or visits made in contexts not always appropriate for minors, high costs for phone calls or emails and distance between the place of detention and the residence of the detainee's family. Another challenge is, from a more relational point of view, the relationship with the child's main caregiver which, presumably, in the case of detained fathers is the mother. Communication between the detained parent and the child often depends on the availability of the main caregiver, who may have to face additional practical and psychological burdens to facilitate such interactions. If the relationship between the prisoner and the caregiver is conflictual, maintaining the bond with the child becomes even more difficult.
One aspect to be taken into consideration when addressing this topic is the beneficial effect that the father-child relationship under these conditions can have on the child himself and the father (Shlafer et al., 2015). Although in-person visits can offer significant benefits, they can also exacerbate pre-existing relational problems. Studies have shown that imprisoned parents often experience high levels of disengagement and low family cohesion even before incarceration, dynamics that tend to worsen following incarceration. Despite these difficulties, numerous studies show that maintaining contact between imprisoned parents and their children offers significant benefits. Constant contact during imprisonment is a positive predictor for family reunification after release and reduces the risk of reoffending. Children also benefit from remaining in contact with incarcerated parents: studies show that this continuity can provide a sense of stability, reduce the trauma of separation and even improve school performance. In contrast, children who do not maintain any contact with the incarcerated parent more frequently report feelings of isolation and anxiety

3. The role of design in the prison context

3.1. Designing spaces and toys

Play is certainly a very important aspect of children's personality development, being not only the main preschool activity but, above all, a learning tool for children (Verkhoturova et al. 2016). Indeed, play is not merely a recreational activity, intrinsically motivated and unfulfilled, but an essential element in the child's development and the establishment of healthy and functional relationships (Neale, 2020). Although the main focus of play is the enjoyment and education of the child, it should not be forgotten that play is an activity provided by adults who teach children how to play and introduce them to socially accepted ways of playing. During early childhood, this role is mainly played by parents who, however, do not always possess the necessary skills to organise play interaction with children. In this regard, there is a contradiction between the need to develop children's play activities at an early age and the unpreparedness of a significant number of parents to perform this role. If we contextualise this discourse to the detention situation, we realise even more that the problem is not only unpreparedness, which the literature has already observed to be a problem in itself, but also the inability to initiate their children into the healthy and functional idea of play, lacking the concrete possibility of creating playful interactions. In this work, the design is precisely concerned with developing a series of toys on the basis of the existing literature, taking the delicate context into consideration. The main focus is on father-child interactions, considering that the literature agrees that the links between fathers' and children's play suggest that play with fathers can contribute positively to children's social, emotional and cognitive outcomes (Amodia-Bidakowska et al., 2020). Several authors have argued the importance of thinking critically about the physical spaces and environments within correctional institutions, which are rarely designed child-friendly (e.g. Peterson et al., 2015; Arditti, 2008). Rethinking physical spaces by

creating more welcoming spaces, with furniture that is more conducive to closeness and decreasing the discomfort inherent in the context, can positively affect the quality of time that father and child spend together.
In these challenges, design plays a crucial role: not only does it allow for the creation of playful tools that are accessible, suited to the needs of both the children and the prison itself, and engaging, but it also enables a simple encounter to be transformed into an experience that is more meaningful and emotionally enriching.
However, few studies have explored how activities should be designed during the time prisoners and children have the opportunity to spend together. The interdisciplinary nature of this work aims to do just that: to intersect the skills of design, architecture and psychology professionals to ensure that an environment that is inadequate for children and hostile to the creation of quality time between parents and children becomes adequate and functional for the development of healthy relationships.

3.2. The Toys

The games presented in this paper were designed by female design students from the Department of Planning, Design and Architectural Technology, under the supervision of Design Professionals and Prison Psychologists. After a careful analysis of the literature relating to the prison context, the father-child relationship and existing games for children aged 0 to 10, the students set about creating the games, focusing on certain aspects, including:
• The improvement of the quality of time that fathers and children spend together;
• The implementation of the father's communication and emotional skills with respect to the child's needs;
• The feasibility of the games with respect to the context and the materials allowed within the context;
• The possibility of creating a game that would not only be used during the interview time but could leave father and child with a memory for all the days after the interview and before the one to follow;
• The consideration of the developmental stages of pre-school and school children.
The games that reached their final version and were then presented to the inmates are described in the following section.
"Let's Shape it!" (Figure 1)
The aim of this toy is to fostering collaboration between fathers and their child allowing them to create something together. The game is based on a very simple but effective concept: the creation of simple images that require the commitment and participation of both. The geometric figures to be used are basic ones, such as the square, the circle, the triangle or the hexagon. To make the experience more engaging, before making the figure, participants have to draw from a pack of cards to find out which figure they are supposed to represent. At the end of the game, a tag can be attached to the picture on which father and son can write whatever they like, their name, the name of the picture or the date on which they made it, so as to have a memento of the moment spent together.
"Mosaichiamo" (Doing Mosaic) (Figure 2)
In this case the aim has been to foster collaboration between father and son. The game has two basic components: the pack of cards with cognitive questions that compete with personal tastes, the emotional sphere and critical thinking, and the mosaic tiles that involve creativity and collaboration. The way Mosaichiamo works is as follows: in turn, you have to draw a card and answer the question, according to the symbol on it you take a tile of the corresponding shape (the player can freely choose only the colour not its shape). Once the card has been chosen, it must be placed where you want on the bottom of the cover. The game ends when the players feel they have completed the entire mosaic. Considering that the purpose of this game is one of cooperation, there is no possibility of winning or losing. (Being a cooperative game, there are no winners or losers).
"Caccia alle sfide" (Hunting for challenges). (Figure 3)

This game takes up the traditional rules of the “game of goose” but introduces a more physical and engaging dynamic: the players, instead of moving a pawn on a board, become the pawns themselves and physically move along the squares of the course, determining their movements by throwing a dice. Each square on the course represents a different challenge to be tackled, depending on the category: motor challenges (challenges involving simple physical activities), emotional challenges (activities designed to help children express their feelings), quiz challenges (simple questions and answers on topics appropriate to the child's age) and riddle challenges (word games that stimulate the child's imagination and logic). The ultimate goal of the game, as in the traditional game, is to get to the final box.

“La nostra storia in una foto” (Our story in a shot). ((Figure 4)

This game aims to facilitate the maintenance of the family bond through shared storytelling, providing an opportunity to have an engaging moment where children can express their emotions and strengthen their connection with the parent. The game consists of the customisation of felt puppets, which can be dressed up and accessorized, allowing for the creation of characters with which parent and child can identify. By customising the characters, the child can play themselves, the parent or other family members, experiencing different dynamics and roles. By choosing clothes and accessories, the child can continuously change the appearance of the characters according to the narrative context, which will then be immortalised in a kind of ‘family photo’. The characters are shaped neutrally and without specific traits, so that they can be adapted to any context. Clothes and accessories offer endless customisation possibilities, making each game experience unique and meaningful.

“In viaggio con papa” (Traveling with Dad). ((Figure 5)

This game represents a path to take together, full of precious moments of mutual discovery. Inspired by the structure of the Game of the Goose, it has been simplified into a practical kit and made more dynamic to keep the attention of even the youngest children and make the playful experience engaging. Participants, with their own pawns, roll the dice and advance on the board, facing trials of various kinds, divided into two types of cards: the yellow ‘Mime’ cards, invite players to mime different animals, offering a simple and humorous interaction that requires only the use of one's body; the green ‘Activity’ cards, propose motor challenges and gestures to be reproduced, encouraging a more direct and physical interaction with the other players. The objective of the game is to get to the last square first.

4. Workshop at an Italian Prison Institute

4.1. Participants

The workshop participants were selected on the basis of specific criteria to ensure the relevance of the intervention and compatibility with the project objectives.

The inclusion criteria were the following:

- Being parents of children in the age groups 0-6 years or 7-12 years, to ensure that the proposed games were appropriate to the development and interests of the children.
- Having an end of sentence less than or equal to one year, in order to focus on prisoners close to release and facilitate the continuity of the father-child relationship after release.
- Not having been convicted of crimes related to domestic violence or ill-treatment, in order to protect the well-being of the children involved and ensure a safe and constructive environment during the workshop.

In total, 25 inmates took part in the two project meetings. To facilitate more effective interaction and in-depth discussion, the participants were divided into two groups of 10-15 people.

For privacy reasons, the only information available on the participants concerns the age and residence of their children. The children are aged between 4 and 10 years and all reside in Italy, within a family context with the presence of at least one relative. Some detainees were born abroad but live permanently in Italy, while none of the children currently reside in care facilities for minors in fragile situations, such as foster homes or protected houses. This targeted

selection made it possible to work with a group of inmates for whom strengthening the bond with their children represented a key element of the reintegration pathway, making the workshop a significant opportunity to promote affective continuity and relational well-being within the prison context.

4.2. Procedure

After the design phase, the games underwent a rigorous evaluation by a commission of experts composed of psychologists, pedagogues, educators and designers. This multidisciplinary group reviewed each product according to several criteria: adherence to pedagogical and psychological theories, appropriateness to the prison context, functionality and usability, feasibility in terms of materials and available space, and playability, i.e. the ability of the game to actively involve parents and children. Following this review, the games were divided into categories based on their nature and educational objectives: some focused on cognitive development and communication skills, while others emphasised the physical and sensory dimension, encouraging contact and active participation.

The experimentation phase took place through a workshop in the prison, during which a designer presented the inmates with a selection of games designed to foster the father- child relationship during interviews. After an initial explanation of the purpose and mechanics of the games, the participants were given the opportunity to interact directly with the materials, observing their operation and testing their dynamics. The aim was to understand how such tools could facilitate communication, stimulate cooperation and strengthen the emotional bond between parents and their children in a complex context such as prison. Subsequently, a focus group was organized, in which the inmates shared their direct impressions and experiences. The discussion focused on various aspects, including the accessibility of the games, the ease of use, the effectiveness in engaging children emotionally and the ability to make the time spent together more meaningful and peaceful. To ensure a structured collection of observations, participants were provided with an evaluation form which allowed them to note down personal reflections, suggestions for improvement and any critical issues encountered.

The information collected was fundamental to further refine the games, adapting them to the specific needs of the penitentiary context. The feedback made it possible to identify any practical obstacles, improve the game instructions and refine the dynamics to make them more intuitive and engaging. The entire process represented an important opportunity not only to test the toys, but also to enhance the role of prisoners as active co- designers, strengthening the sense of participation and responsibility in improving the experiences of meeting with their children.

4.3. Discussion and conclusion

The theme proposed in this project immediately proved to be appealing to those who worked on it, the direct beneficiaries of the activities, and the institutions involved. The inmates actively participated in all the activities in which they were involved, quickly grasping their deep meaning and recognizing the project’s functionality.

The creation of toys for children sparked immediate curiosity among the inmates, who engaged in in-depth discussions on various aspects, including materials, feasibility, children's engagement, the possibility of playing with multiple participants, and originality. These elements were debated both among the inmates themselves and with professionals. It emerged that penitentiary facilities have very limited availability of toys that can be used with children, and the few that do exist do not allow for continuous interaction with their children. Additionally, there are no toys that allow the child to take a piece home, serving as both a keepsake and a continuity element until the next visit.

This point is particularly significant for inmates, who report experiencing great distress in the waiting time between visits, struggling to find effective ways to interact with their children during phone and video calls, especially when they are very young and still pre- verbal. The

possibility of having a toy that could serve as a discussion topic and involve the child even from a distance is considered a valuable resource by the inmates themselves. This would enhance their parental self-efficacy by providing tools to maintain the child's attention during calls and facilitate communication.
Another crucial aspect highlighted by the inmates is the importance of physical participation in play: the ability to have physical contact, move, and share spaces is fundamental for enhancing the play experience and enabling father-child interaction even when cognitive or emotional resources are limited.
Regarding the usefulness of these toys and the significance of the father-child relationship, inmates emphasized an essential point: the broader impact of the project on social reintegration. The key aspects identified include:
- Strengthening family bonds: Positive parenting fosters responsibility and a sense of belonging, motivating inmates to adopt constructive behavior both inside and outside prison.
- Reducing the risk of recidivism: Feeling needed and appreciated as a parent lowers the risk of self-sabotaging behaviors and social disengagement, encouraging inmates to pursue personal change and reintegration into society. Reclaiming the parental role helps build a future-oriented vision centered on both individual and family well-being.
- Improving social and communication skills: The project provides a shared experience among participants—the role of a father—which involves continuous challenges. Engaging with other inmates in similar situations facilitates open and emotionally meaningful communication.
- Intergenerational impact: By prioritizing the well-being of children, fostering a positive relationship with their incarcerated parent reduces the risk of behavioral difficulties and social marginalization, ultimately benefiting the broader community by creating a more stable and inclusive social environment.
- Restructuring personal beliefs and values: Positive parenting serves as a powerful tool for developing key values such as responsibility, empathy, and duty—essential elements for effective and lasting reintegration into society. Through caring for their children, inmates gain deeper awareness of the consequences of their actions and learn to consider the needs and rights of others, particularly their own children.
These findings highlight the project’s potential to be expanded and implemented in other penitentiary institutions. Moreover, adapting it to different European contexts while considering country-specific legal frameworks and cultural practices could further enhance its impact.
In conclusion, the project has demonstrated a significant effect not only on the father-child relationship but also on the emotional well-being of inmates and their perception of their parental role. The enthusiasm and active participation of the inmates underscore the need for concrete tools to maintain strong family bonds even within the prison system. Furthermore, the project’s positive outcomes—such as the strengthening of parental skills, reduction of recidivism risk, and improvement of social dynamics—suggest the feasibility of extending it to other penitentiary institutions in Italy and beyond. By adapting the model to the specific legal and cultural contexts of each country, it could serve as a valuable tool to support inmates’ social reintegration and improve the well-being of their children, ultimately contributing to a more inclusive society that values and nurtures family relationships.

Figure 1. “Let’s Shape it!”; student author Sara Salvadori

Figure 2. “Mosaichiamo” (Doing Mosaic); student author Elena Medardo

Figure 3. “Caccia alle sfide” (Hunting for challenges); student author Chiara Pruneti

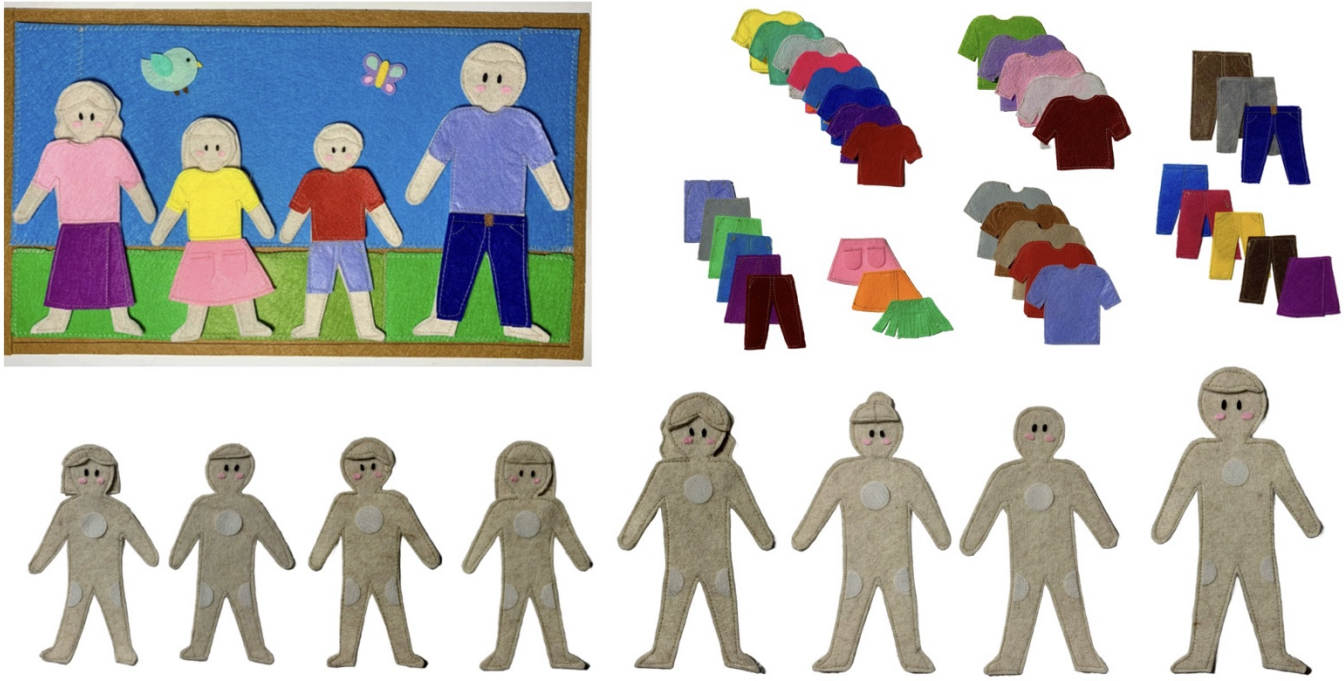

Figure 4. “La nostra storia in una foto” (Our story in a shot); student author Martina Falasca

Figure 5. “In viaggio con papa” (Traveling with Dad). student author Martina Fort

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PROBLEMATIZING CULTURALLY TAILORED SMOKING CESSATION STRATEGIES THROUGH DISCURSIVE DESIGN

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ABSTRACT | This research explores how discursive design can expand problematization and generate insights into culturally tailored and targeted (CTT) smoking cessation interventions for LGBTQ+ populations. Given the persistent tobacco use disparities facing this population and the limitations of conventional, evidence-based interventions, alternative approaches to intervention development are needed as complements to traditional methods.

We developed and presented two pairs of discursive speculative interventions to three focus groups composed of public health experts and social work, psychology, and chemistry professionals, who often collaborate on developing public health interventions. The concepts ranged from passive, receipt-based quit messaging to more provocative strategies, such as deepfake-driven behavior disruption and two-factor authentication for vaping devices. The objective was to assess whether discursive design could surface new perspectives on CTT strategies, highlight overlooked considerations, and inspire novel intervention possibilities.

Findings suggest that discursive design effectively provoked critical dialogue around the feasibility, ethics, and unintended consequences of CTT interventions. However, participants varied in how deeply they engaged with CTT strategies. Those with knowledge of LGBTQ+ populations reflected more critically on sociocultural tailoring, while others focused primarily on feasibility. Some participants also struggled to suspend their disbelief in engaging with

the concepts, pointing to challenges in applying discursive methods within traditional public health paradigms.

In demonstrating design's potential to contribute to problematizing culturally relevant intervention strategies, this study underscores the value of interdisciplinary approaches in addressing health disparities. It invites public health professionals to reconsider how alternative methods of problem framing can lead to more responsive and innovative interventions.

KEYWORDS | Public Health, Discursive Design, Problematizing, Focus Group, Smoking Cessation

1. Introduction

The tobacco industry has a long history of leveraging design to entice consumers, from iconic advertising featuring the Marlboro Man by Leo Burnett and cigarette "tap-tap" packaging to attractive vaping devices (DiFranza et al., 2003; Wakefield et al., 2002). In contrast, despite growing recognition of the value design brings to public health initiatives (Bazzano and Martin, 2017), its roles often remain limited. Designers are typically brought in late in the intervention development process—relegated to adding the final coat of varnish, rather than shaping the intervention from the start. This disconnect stems from a misunderstanding of design's original capacity to problematize and nurture a particular moral phenomenology (Proulx, 2019; Proulx et al., 2019).

Part of a broader body of research addressing smoking cessation among LGBTQ+ populations—a group with nearly double the smoking prevalence of the general population (Riley et al., 2023)—this research explores how designers can surface new issues and opportunities for culturally tailored and targeted (CTT) public health interventions. Indeed, while evidence-based interventions have made strides in reducing smoking prevalence in the general population, their success in attenuating tobacco use disparities is limited. Therefore, further research remains essential to grow our understanding of the issues at stake and explore alternative intervention methods (Baskerville et al., 2017).

To expand the problematization of, and bolster perspectives on, alternative approaches to reducing tobacco use and dependence among LGBTQ+ populations, we organized three focus groups with public health and allied experts. We gathered experts' reactions to four discursive and speculative design concepts in these focus groups. Drawing on methodologies from Auger (2013), Tharp & Tharp (2013, 2018), and Kinch et al. (2024), the design concepts envisioned uncanny, radical, and preposterous—yet culturally relevant—smoking cessation interventions, intended to provoke critical reflection and foster nuanced dialogue among participants.

This paper presents the intervention concepts, a summary of experts' responses, and a discussion of the value a design perspective brings to the problematization of CTT smoking cessation interventions. Ultimately, our research highlights the potential contributions of design in public health and expands the conversation on culturally responsive strategies to reduce health disparities.

2. Background

2.1. Persistent Challenges in Public Health

Despite ongoing efforts to address public health challenges, many problems persist, with tobacco cessation standing out as a particularly wicked problem (Rittel & Webber, 1973). While the landmark 1964 Surgeon General's report (Lushniak et al., 1964) initiated a new wave of research aimed at developing multilevel, evidence-based interventions to reduce tobacco use (US Dept HHS, 2020), declines in smoking rates have not been realized across all populations, including LGBTQ+ people (Li et al., 2021; Buchting et al., 2017). Emerging literature in LGBTQ+ tobacco control reveals a complex web of psychosocial and environmental factors that contribute to elevated tobacco use rates, including structural stigma (i.e., discriminatory laws and practices), interpersonal minority stress and coping, targeted marketing by the tobacco industry, and social tobacco norms.

Yet despite these realities, LGBTQ+ populations remain underrepresented in public health research: only 0.8% of National Institutes of Health funding addresses LGBTQ+ people—most of it focused on HIV prevention and treatment (Wiedeman et al., 2025)—and less than 2% goes to tobacco research (Hughs et al., 2016), with awarded research projects in decline (Meissner et al., 2022).

2.2. Limitations of an Evidence-Based Approach

These gaps are problematic because evidence-based approaches—often the foundation of public health intervention development—rely on reviewing existing data and scientific literature to help define the health problem; understand the priority population and context; and identify facilitators, barriers, and uncertainties related to implementation (O'Cathain et al., 2019). However, without robust funding for LGBTQ+- and tobacco-focused research, our ability to develop evidence-based interventions to reduce tobacco use disparities among this priority population is limited

Furthermore, while evidence-based approaches are valuable for grounding interventions in established knowledge to support feasibility and effectiveness, they are often based on generalized perspectives. These can constrain our ability to respond to the particularized and nuanced realities of tobacco use cessation in specific populations and contexts. Accordingly, this traditional approach may fall short in producing solutions that fully address the needs of LGBTQ+ populations.

To better address the complex social and cultural factors that drive tobacco use disparities, LGBTQ+ health researchers recommend applying cultural tailoring and targeting (CTT) to interventions (Antin et al., 2024; Patterson et al., 2024). Generally, CTT requires systematically modifying evidence-based interventions to align them with specific populations' psychosocial experiences, norms, beliefs, and actions (Lapinski et al., 2024). Evidence indicates that adding CTT components to evidence-based tobacco cessation interventions intended for the general population can improve cessation rates among minoritized populations (Leinberger-Jabari et al., 2023).

2.3. The Need for Alternative Problematization Methods

While CTT can lead to more culturally responsive solutions, their development often

remains grounded in what is considered 'probable' or 'plausible' (Voros, 2017), shaped by existing evidence. This orientation, rooted in "our current understanding of how the world works" (Voros, 2017), may limit innovation, yielding only incremental advancements (Verganti, 2008) when more novel approaches are needed. So we ask: What else might be possible? What perspectives or pathways remain unexplored, and might they more effectively address tobacco-related disparities among LGBTQ+ populations?

We therefore see a need to explore alternative approaches to problematization—ones that do not *replace* evidence but *complement* it. Methods that foster critical reflection, provoke new questions, and surface underexamined issues early in the process can expand how we conceptualize intervention strategies, uncovering novel insights and ideas that can later be refined and tested through traditional evidence-based approaches. We argue that discursive design is one such method, offering a way to approach smoking cessation from a different angle, unpack the complexities of public health challenges, and expand the space for innovation in intervention development.

2.4. Discursive Design in Public Health

As described by Tharp & Tharp (2013), discursive design involves creating artifacts as "tools for thinking"—designs not intended for real-world, practical implementation but aimed at stimulating reflection and "substantive, values-based exchange" among an audience about an intended discourse (pp.407–408). By leveraging the "visual and experiential" qualities of artifacts (Tharp & Tharp, 2018, p.115), this approach can stimulate "critical assessment" of an idea and "personal or emotive reflection" (p.118). In this way, discursive design can provoke alternative perspectives on problems that evidence-based methods alone may not.

Discursive design can be utilized in applied research, particularly as we envision its use in public health, to create artifacts that probe "subjects' attitudes, beliefs, and values that are otherwise more difficult for researchers to access" (Tharp & Tharp, 2018, p.292). This problematization process, facilitated through design artifacts, fosters a "better understanding of the issue" and ultimately supports the creation of "better products, services, and systems," or, in our case, interventions aimed at addressing health disparities (Tharp & Tharp, 2018, p.292).

3. Research Goal and Methodology

To examine the relevance of discursive design in surfacing new ways of accounting for culturally relevant public health interventions, we developed and presented two intervention concept pairs to three focus groups of public health and allied experts. These concepts—or discursive artifacts—served as stimuli to provoke reflection on the assumptions, limitations, and alternative possibilities of CTT strategies. Drawing on insights from these sessions, which engaged six participants, we analyzed *whether* and *how* the discussions problematized components of CTT and explored the perceived utility of discursive methods. To guide this inquiry, the study asks:

How might discursive design participate in the problematization of culturally tailored and targeted strategies aimed at envisioning innovative solutions for public health disparities?

This working paper presents preliminary findings from ongoing research examining the capacity of discursive design to expand conversations about cultural relevance and surface innovative strategies to address health disparities. In response to emergent insights from the focus groups, the study also proposes hypotheses about factors shaping experts' engagement with CTT problematization. Furthermore, we offer recommendations for refining discursive design methodologies to strengthen their contribution to public health intervention development.

3.1. Discursive Speculative Artifacts Development

A central component of our methodology involved designing discursive artifacts that could provoke critical examination of CTT strategies for LGBTQ+ populations. The development of these intervention concepts was informed by three key areas of literature:

1. Frameworks for developing provocative discursive and speculative designs (Auger, 2013; Kinch et al., 2024; Tharp & Tharp, 2013, 2018; Voros, 2017);
2. Approaches to cultural tailoring and targeting (Kreuter et al., 2003); and
3. Research on the unique determinants of tobacco use among LGBTQ+ populations, including cessation barriers, psychosocial experiences, norms, beliefs, and behaviors from a broad body of public health literature.

A key influence in shaping the artifacts was Kinch et al.'s (2024) playful speculative design framework, which emphasizes exploring the "peripheral design space" they call "the preposterous" (p. 3). This concept originates from Voros' (2017) expansion of Hancock and Bezold's (1994) Futures Cone framework (Figure 1), which defines preposterous futures as "the futures we judge to be 'ridiculous,' 'impossible,' or that will 'never' occur."

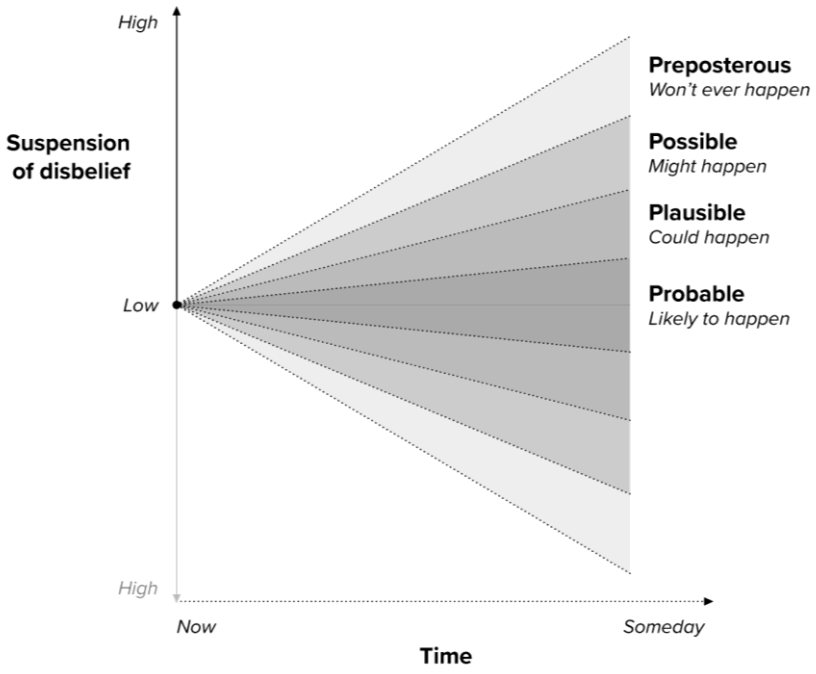

Figure 1. Futures Cone diagram adapted from Kinch et al. (2024), based on Voros' (2017) Futures Cone.

Preposterous alternatives stand in contrast to the 'probable', 'plausible', and 'possible' futures—categories that reflect what is likely, could, or might happen. These futures, we argue, parallel the conceptual space in which most public health interventions are currently imagined: bounded by feasibility, realism, and precedent. Kinch et al. (2024) suggest that venturing into preposterous territory "challenges our conventional thinking and ignites curiosity" by tapping into our imaginative capacities (p. 6). This framing aligned well with our aims: not to propose implementable solutions but to use speculative provocation as a means of problematizing CTT in tobacco cessation—and expanding the range of possibilities considered in intervention design.

To structure participant engagement, we presented the speculative interventions as contrasting pairs: each included one "conventional" intervention—aligned with a probable or plausible future—and one "preposterous" alternative. Each pair was grounded in a shared strategy or context to foreground their contrast. This juxtaposition aimed to provoke deeper reflection through two mechanisms. First, the conventional intervention served as an accessible entry point, offering familiar conditions to help participants ground their understanding—a framing informed by Auger's (2013) "ecological approach."

Second, the preposterous intervention, presented afterward, was designed to amplify cognitive dissonance and evoke what Freud described as "the uncanny," as discussed by Auger (2013), thereby encouraging more critical engagement with the assumptions underpinning culturally tailored intervention strategies. To support this effect, we presented the concepts as high-fidelity visual mockups embedded in narrative scenarios. A step-by-step slideshow guided participants through each intervention's context and application, fostering an immersive experience that encouraged them to imagine the interventions as real, supporting reflection.

3.2. Participant Sampling and Recruitment

Six participants were recruited via professional networks for their expertise in tobacco regulation, prevention, cessation, and LGBTQ+ health. They included public health experts specializing in health behavior and health promotion, epidemiology, and environmental health, along with professionals from social work, psychology, and chemistry, reflecting the interdisciplinary nature of intervention development.

3.3. Focus Group Procedures

Focus group sessions were conducted via Zoom, each lasting 1.5 hours and including two participants to allow for in-depth discussion. Participants signed digital consent forms permitting video and audio recording for transcription and analysis. All sessions followed a similar structure (Table 1).

Table 1. Phases of the Discursive Design Focus Groups.

Phase	**Procedures**
Phase 1: Overview of Discursive Design	Sessions began with introductions and an overview of discursive design and its hypothesized potential for problematizing public health challenges. The concept of "the preposterous," framed via Voros' (2017) Futures Cone, was introduced to explain the rationale for exploring speculative interventions.

	The phase concluded with a session outline, space for clarifying questions, and reaffirmation of recording consent.
Phase 2: Engagement with Discursive Design	Participants engaged in reflection and discussion of two contrasting intervention pairs (conventional vs. preposterous), each presented through scenarios. For each intervention: 1) a theme overview was given; 2) participants viewed a scenario walkthrough; 3) they completed a written reflection; and 4) they participated in a group discussion. The second pair omitted written and verbal reflection for the conventional intervention to allow more time for the preposterous concept.
Phase 3: Wrap-Up and Reflection on Discursive Design	Participants reflected on the value of discursive design for public health, guided by three discussion questions on its usefulness, limitations, and the role of designers in public health.

3.4. Analysis

Focus group transcripts were analyzed thematically using a mix of descriptive and interpretive coding strategies (Adu, 2019b, p. 57) to assess whether participants problematized aspects of CTT—thereby evaluating the method's impact—and to generate hypotheses about factors influencing the depth and focus of their responses.

4. Discursive Speculative Intervention Pairs

4.1. Pair 1: From Passive Cues to Direct Confrontation—Cultural Targeted and Tailored Interventions at the Point of Purchase

This intervention pair explores the point of purchase as a strategic setting for engaging LGBTQ+ people who smoke through culturally tailored and targeted (CTT) interventions. National policies requiring health warnings on cigarette packaging illustrate this setting's potential to prompt reflection at a critical moment of decision-making (Hammond et al., 2007). These concepts are responses to key questions: What other opportunities exist to intervene in this context? How can such interventions be made more engaging and relevant for priority populations?

In terms of tailoring and targeting, the conventional concept (Table 2, Figure 2) uses a peripheral targeting approach, making explicit references to LGBTQ+ identity (Kreuter et al., 2003, p.135). The preposterous concept (Table 3, Figure 3), by contrast, uses deeper sociocultural tailoring—subtly embedding LGBTQ+ values and experiences (Kreuter et al., 2003, p.136) by referencing minority stress and chosen family (Abreu et al., 2023).

Table 2. Pair 1: Conventional Concept Description.

Concept Type	**Description**
Conventional: Receipt-Based Messaging for Inclusive, Peripherally	This intervention uses purchase receipts to deliver culturally targeted cessation messaging. At checkout, receipts print quitline information with inclusive phrasing (e.g., "Quit Tobacco Your Way") that reflects LGBTQ+

Targeted Cessation Support	values of acceptance and inclusion (Abreu et al., 2023). A QR code links to a quitline site with affirming language, LGBTQ+ imagery, and a visible badge indicating counselors have completed cultural competency training. The approach relies on passive messaging and voluntary engagement.

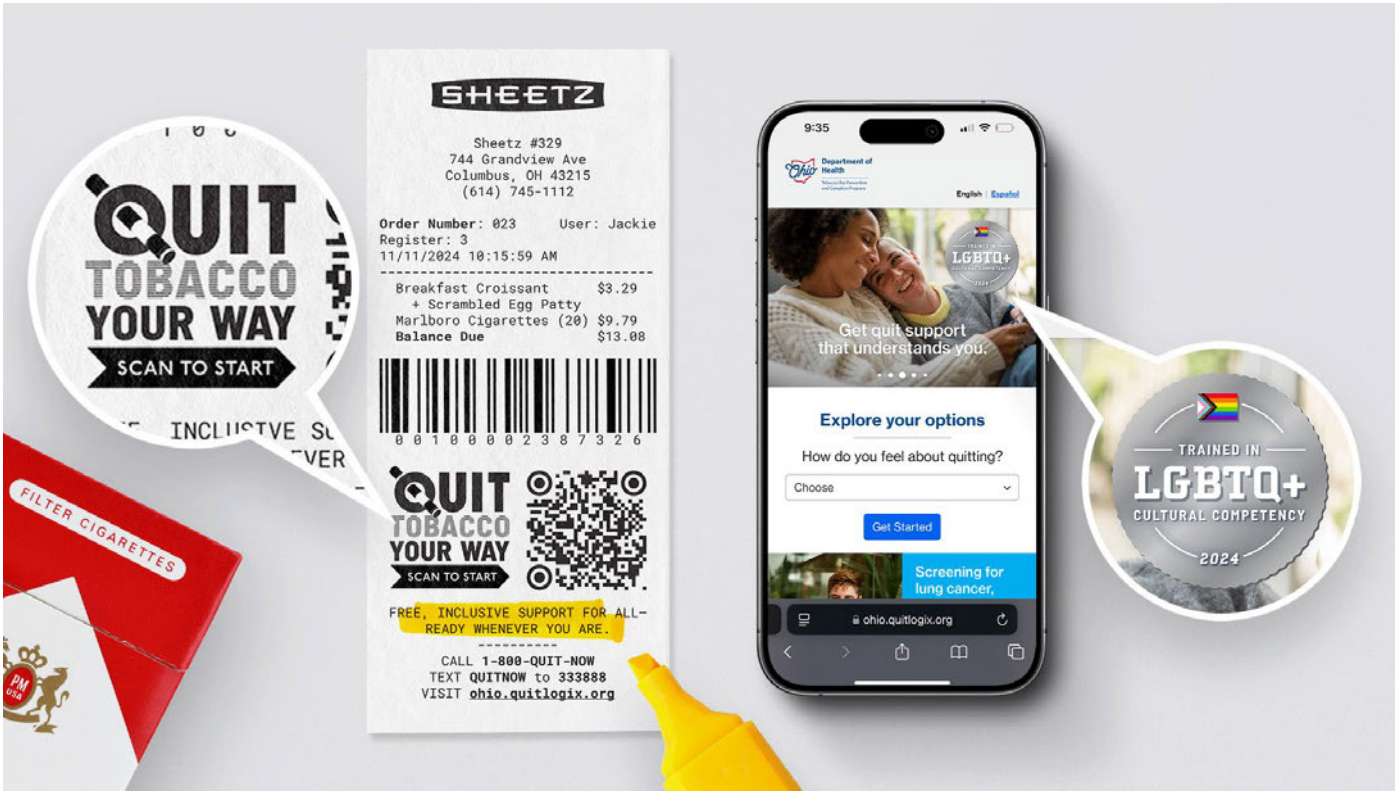

Figure 2. A point of Purchase intervention featuring purchase receipts with culturally targeted quit messaging. A QR code links to an LGBTQ+-inclusive quitline, with callouts highlighting affirming language and a counselor training badge.

Table 3. Pair 1: Preposterous Concept Description.

Concept Type	**Description**
Preposterous: Deepfake-Driven Personalization for Socioculturally Tailored Behavior Disruption	This preposterous intervention imagines a hyper-personalized tailoring strategy using RFID (radio frequency identification) to extract smartphone data at the point of sale. A deep fake video of the customer—generated via facial recognition and stored images—appears on the payment screen, delivering a socioculturally tailored anti-smoking message in their own voice. The message references personal relationships to heighten emotional impact and ends with a forced-choice prompt: "Will you remove the cigarettes from your purchase?" Unlike the conventional approach, this intervention uses intrusive, personalized messaging to confront the customer directly.

Figure 3. ***Bottom left***: A pop-up screen interrupts the purchase with a "Pause Before Purchase" message. ***Top***: A deepfake video uses the customer's likeness, voice, and personal photos (e.g., their home) to enhance the uncanny effect (Auger, 2013). ***Bottom right***: A forced-choice prompt asks whether to proceed or remove cigarettes from the purchase.

4.2. Pair 2: Disrupting Convenience to Challenge Vaping Behaviors—From Motivational to Coercive Sociocultural Approaches

The second intervention pair addresses e-cigarette cessation. Although vaping is often promoted as a harm reduction tool for cigarette use, it carries risks, especially for youth, due to its addictive nature and effects on brain development (Dinardo & Rome, 2019). The issue is particularly relevant to LGBTQ+ communities, where both LGBTQ+ youth (Truth Initiative, 2024) and LGB adults (U.S. Dept. HHS, 2024, p.92) report higher rates of e-cigarette use than their non-LGBTQ+ peers.

One driver of vaping uptake is convenience: vapes are discreet, odorless, and usable in places where smoking is banned (Kava et al., 2021). This pair explores how disrupting vaping's convenience might encourage cessation, contrasting a motivational approach (Table 4, Figure 4) with a coercive one (Table 5, Figure 5), while also examining deeper sociocultural strategies for CTT (Kreuter et al., 2003, p.136).

Table 4. Pair 2: Conventional Concept Description.

Concept Type	Description
Conventional: Supportive, Socioculturally Targeted Signage for Minority Stress-Driven Vaping Cessation	This intervention reimagines no-smoking/no-vaping signage by incorporating culturally targeted messaging with a sociocultural lens. It acknowledges stress—a common reason LGBTQ+ individuals vape—while directing viewers to cessation resources. Placed in LGBTQ+ bars, clubs, and other high-risk settings, the signs balance restriction with support, reinforcing inclusivity and encouraging cessation.

Figure 4. An intervention where no-smoking/no-vaping signage integrates stress-related messaging and a QR code linking to cessation resources—pairing restriction with support.

Table 5. Pair 2 : Preposterous Concept Description.

Concept Type	Description
Preposterous: Two-Factor Authentication as a Friction-Based Disruption to Social Vaping Norms	This preposterous speculative intervention imagines an FDA regulation requiring two-factor authentication (2FA) for vape devices to disrupt convenience and habitual use. When a user presses the activation button, a push notification prompts them to confirm: "Want to vape? Confirm to proceed." If they select yes, they must unlock the vape by holding their phone to their face for the duration of use. These added steps increase social visibility and friction, making vaping more time-consuming. In social settings like bars or workplaces, this verification process applies a sociocultural CTT approach by disrupting LGBTQ+ social vaping norms and potentially deterring use over time.

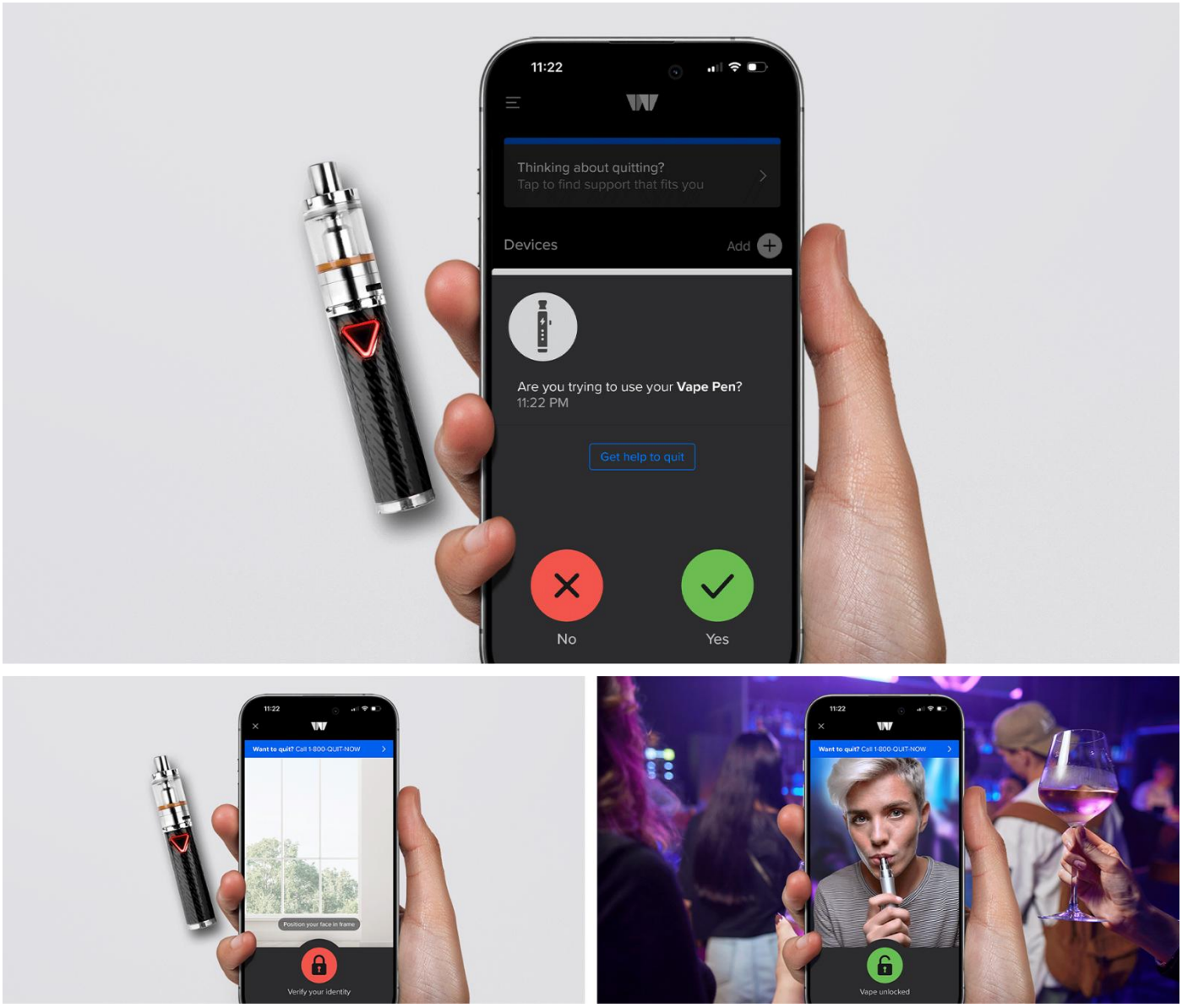

Figure 5. ***Top***: Attempting to activate the vape triggers a smartphone push notification requiring confirmation. ***Bottom left***: Users must hold their phone to their face for the vape to unlock; here, the device remains locked as the face is out of frame. ***Bottom right***: The intervention's visible authentication process disrupts social vaping norms, making use more conspicuous and potentially deterring habitual behavior.

5. Results and Discussion

5.1. Evaluating the Impact of Discursive Design

Tharp & Tharp (2018) note that measuring the impact of discursive design in applied research is challenging due to factors such as unintended consequences, both positive and negative, and variable contexts, which can produce variable responses (pp. 295–296). As such, they argue it is more important for discursive design to *have* an impact than to *measure* it (p. 285). Still, when evaluation is necessary, as in this study, they propose audience reflection as a baseline indicator of success (p. 290). Because reflection can be broad and ambiguous, they also outline a more structured framework of three successive levels of effectiveness for evaluating impact: relevant thinking, responses, and actionable insights. Table 6 summarizes these levels, including definitions, methods of assessment, and their application in this study.

Table 6. Levels of Impact in Evaluating the Success of Discursive Design in Applied Research.

Level of Impact	Primary Impact	Secondary Impact	Tertiary Impact
Indicator of Success	Relevant Thinking	Relevant Responses	Actionable Insights
Definition & Measurement	Occurs when the discursive artifacts "stimulate subjects' thinking [about the issues in question] to the extent that researchers subsequently determine that it is relevant and potentially useful" (Tharp & Tharp, 2018, p.292).	Occurs when participants "respond in ways that reveal information that is germane to the line of inquiry" to the extent that it can be collected and synthesized (Tharp & Tharp, 2018, p.292).	Occurs when the insights generated can directly or immediately "contribute to solutions or design outcomes" (Tharp & Tharp, 2018, p.292).
Application to This Study	Relevant thinking is defined as thought processes that problematize or act as fuel for deeper problematization of CTT in intervention development.	Relevant responses are spoken reflections that problematize or act as fuel for deeper problematization of CTT in intervention development.	Actionable insights are reflections that can directly inform the development of novel CTT solutions.

Since we cannot directly *access* participants' thoughts, our evaluation focuses on two measurable indicators: (1) relevant responses as an observable outcome of relevant thinking and (2) actionable insights derived from these responses.

5.2. Relevant Responses and Actionable Insights

This study first asked whether discursive design can effectively problematize CTT components to envision innovative solutions for public health disparities. Based on our analysis, we believe it can: indeed, participants generated relevant responses and actionable insights. Table 7 illustrates this with a sample of three responses.

Table 7. Sample of participant responses problematizing CTT strategies and corresponding actionable insights.

Intervention Discussed	**Participant Response**	**Aspect(s) of CTT Problematized**	**Derived Actionable Insight(s)**
Pair 1: Conventional Concept	"And then, once they get there [the quitline website], there's potential for cultural tailoring within that program. I guess the one thing that I thought might be difficult is the cultural tailoring because, you know, from the point they scan that code on the	Lack of automatic tailoring at the point of access; difficulty in ensuring a culturally tailored experience when users must self-select	Include an optional intake process upon accessing the quitline website (e.g., a brief survey or user-driven selection tool) to facilitate tailored messaging and resources.

	receipt, you don't know if the person is LGBTQ or any other aspect of cultural tailoring. So it would almost have to be, you know, self-select your tailoring pathway once you get there." (Participant 5)		
Pair 1: Preposterous Concept	"But I was thinking that some of these principles could work really well, again, if it was a more optional, personalized kind of thing. Cause I did find the references to family and things like that very relevant. So, if that's something Robin could input and then get reinforced back out at her […] it's a way of using some of this stuff in a way that's maybe more palatable to everybody involved [laughs]." (Participant 2)	Personalization of intervention content; potential aversion to forced tailoring methods	Implement optional personalization features where users input their own motivators (e.g., family, financial goals) to generate a tailored intervention response.
Pair 2: Preposterous Concept	"I've seen a lot of people vaping in real life at part[ies] or at social gatherings, [and] like outside of diner[s]. And they just vape there. And with their friends. It's not like a family dinner or lunch stuff. So it doesn't really, change much." (Participant 6)	Social reinforcement of vaping in peer settings; potential ineffectiveness of individualized cessation strategies in social contexts	Design interventions that disrupt social reinforcement of vaping rather than disrupting its convenience.

While some responses problematized CTT mechanisms—such as how discursive interventions signal inclusivity or personalize messaging (e.g., Participants 2 and 5)—others focused on broader concerns like feasibility and social context, including the challenge of addressing social reinforcement of vaping (Participant 6). These responses highlight multiple dimensions to consider in CTT intervention design.

Although the sample responses in Table 7 suggest that the discursive artifacts could spark relevant insights for CTT interventions, direct engagement with specific components of tailoring and targeting was somewhat limited. Participants more often raised concerns about feasibility, privacy, and general social acceptability than culturally relevant elements.

This pattern underscores a key strength of the discursive design methodology as applied in this study: by prompting early reflection through contextually situated artifacts, it can surface both CTT-related and broader implementation concerns often deferred until later stages, making implicit assumptions explicit and enabling more proactive, context-responsive problem-solving.

At the same time, the limited focus on CTT underscores the need to examine *what* participants chose to problematize, *why*, and *how deeply and readily* they engaged in

such problem framing. The following two sections outline key themes that emerged from our data and offer hypotheses about factors shaping expert engagement with the discursive speculative intervention concepts. If these hypotheses hold, they carry implications for who should be involved in discursive design sessions and how to support their engagement, both critical for generating meaningful impact.

5.3. Expertise and Problematization: Who Should Be at the Table?

Our preliminary findings suggest that participants' professional backgrounds shaped engagement with CTT problematization. Those with more LGBTQ+ health expertise seemed to offer more nuanced critiques, attending to the degree of tailoring and its broader implications. For instance, in response to Pair 1: Conventional Concept, Participant 2 reflected on the tension between a broad versus population-specific focus:

> "I really appreciated […] the broadly inclusive focus of the receipt. And then, say you did use the QR code and go to the website—would the focus on LGBTQ populations actually potentially create barriers or disrupt in some way other marginalized populations? […] Is focusing on one population the most effective approach versus presenting material in some way that shows inclusion across populations? Also, because of intersectionality in LGBTQ populations […] what subgroups?" (Participant 2)

Such reflections suggest that familiarity with LGBTQ+ issues (or the intended priority population) may support a deeper interrogation of CTT's assumptions and trade-offs. Participants with more experience working with LGBTQ+ populations appeared more attuned to deep tailoring strategies that address psychosocial factors, norms, and behaviors (i.e., sociocultural strategies) (Kreuter et al., 2003, p. 136). In contrast, those with less LGBTQ+ expertise more often focused on whether an intervention *appeared* tailored, relying on explicit, surface markers of inclusion (i.e., peripheral strategies) rather than examining how it was tailored, why it was designed that way, or what the implications might be (Kreuter et al., 2003, p. 135).

We do not call attention to these differences to suggest that one orientation is inherently better or more valid than another. Rather, we emphasize their practical relevance for public health research and intervention development, particularly when assembling expert teams to problematize culturally tailored and targeted interventions. These differing lenses and orientations highlight the importance of including experts with deep knowledge of the priority population to ensure contextual depth in discussions related to that group, while also involving a diverse mix of professionals to surface unanticipated considerations, challenge assumptions, and support more expansive forms of problematization.

This said, while we hypothesize that professional background influenced participants' engagement with CTT by shaping their proclivities towards certain interpretations or focal points—a point we do not claim is novel—we do not suggest it was the only factor. For instance, although the literature draws clear distinctions between peripheral, sociocultural, and other CTT strategies (Kreuter et al., 2003), our findings suggest that these boundaries are often more fluid—and at times conflated—in practice. This points to the need for further research on how such strategies are perceived, interpreted, and applied in real-world intervention development, and highlights the potential of discursive design as a platform for that exploration.

Future research could apply Harvey Sacks' Membership Categorization Analysis (MCA) to examine how participants invoke professional identities in dialogue (Oak, 2009, p. 306)—a particularly relevant approach given that many framed their assessments through disciplinary lenses, often referencing their field. This could yield deeper insight into how disciplinary backgrounds shape problematization in discursive design sessions. Additionally, integrating 'constituent-involving strategies' (Kreuter et al., 2003) into discursive design, such as co-designing or evaluating artifacts with community members, may deepen engagement and ground responses in lived experience.

5.4. Readiness for Speculative Thinking: Challenges and Opportunities

Assembling the right mix of expertise is only part of the equation. Once the right people are at the table, how do we effectively engage them in problematizing a given topic? This section outlines two distinct issues that emerged in discursive speculative engagement with CTT: (1) misunderstandings of speculative framing and the aims of discursive design, and (2) disciplinary constraints on speculative thinking.

First, participants seemed to have varying interpretations of the conventional versus preposterous framing. While some participants appreciated the structured progression from familiar to speculative ideas, others expressed confusion or resistance to the framing. Participant 2, for example, found the scaffolded approach helpful in understanding the purpose behind the discursive speculative process:

> "I think one thing I really appreciated about this experience is that it was scaffolded so well. Like, you walking us through each step and building to it, understanding the purpose behind it and why this big future-thinking kind of approach is important, was really helpful." (Participant 2)

In contrast, Participant 4 questioned the effectiveness of presenting conventional interventions first and challenged the classification of the Pair 1: Conventional Concept as conventional altogether:

> "If the QR code was the more conventional type of intervention, your other two scenarios did nothing but redirect us to go back to the first one. […] So now, if I imagine your methodology presenting these two [preposterous concepts] before the QR code—we might have another reflection on that. […] we would not go back all the time saying like, "Hey, the QR code is a great idea." […] for us—for me—it's not conventional. […] I don't know if presenting [Pair 1: Conventional Concept] at the beginning is shooting yourself in the foot because the [preposterous concepts] seemed really imaginative and far from reality. But the QR code could be implemented tomorrow." (Participant 4)

This response highlights two challenges in how participants engaged with the discursive design methodology. First, some appeared to conflate "conventional" with a lack of novelty or innovation. However, our framing aimed to distinguish between *incremental* innovation within existing systems (i.e., conventional concepts) and more *transformative*, speculative possibilities (i.e., preposterous concepts) (Verganti, 2008; Kinch et al., 2024). Comments like Participant 4's suggest that perceptions of what counts as conventional or preposterous are often relative.

Second, there was a tendency to treat the artifacts as implementation-ready proposals rather than reflective tools, prompting surface-level critiques of feasibility rather than deeper consideration of implications, assumptions, and possibilities. These challenges underscore the need for clearer framing and facilitation in future sessions.

Furthermore, these observations highlight how disciplinary and professional backgrounds may shape participants' willingness and ability to engage in speculative thinking. Some found it difficult to suspend disbelief, reverting to practical concerns or feasibility critiques, possibly reflecting entrenched disciplinary norms, expectations, and constraints. Participants 5 and 6 directly addressed this issue when reflecting on the strengths and limitations of discursive design.

Participant 6, for instance, highlighted practical barriers such as fiscal constraints, time limitations, and the rapidly evolving tobacco landscape as challenges for integrating discursive design into intervention development:

> "Creating a new intervention already takes a lot of money and time. But with this approach, […] it's going to take two or three times more than that, because you have to think from the extreme phase to the realistic phase too. That's why, practically speaking, discursive design as a methodology […] is it really beneficial to take that money and time? Our resources are limited. Like, in research—the tobacco industry is getting changed very rapidly—new tobacco products are appearing right now." (Participant 6)

In response, Participant 5 pointed out how academic environments may discourage risk-taking:

> "And maybe one of the issues is context, too, [Participant 6], because we are in academia, where we are not reinforced for taking great risks […] In industry, there are plenty of places where people are ready to pursue big ideas and have the funding to do it." (Participant 5)

This prompted Participant 6 to reflect on their professional conditioning and how it may have influenced their engagement with the speculative concepts:

> "I'm biased because I'm an academician. So, I'm always taking the most safe, most conventional thing. […] some people want to take a risk—no risk, no gain, so, high risk, high return. So that could be a strength or weakness." (Participant 6)

This exchange illustrates how professional norms can both limit and enable speculative engagement. Future research could explore how such norms shape participation, offering insights to refine facilitation strategies for varying levels of speculative readiness. Addressing these barriers—through shared definitions, refined framing, or speculative warm-ups—may foster discursive design's capacity to generate more nuanced, future-oriented insights.

6. Conclusion

Our preliminary findings highlight discursive design as a promising tool for problematizing cultural tailoring and targeting strategies in developing interventions for LGBTQ+

communities and other populations experiencing health disparities. Public health and allied experts were generally receptive, showing a willingness to collaborate with designers—an encouraging sign for interdisciplinary partnerships that could expand how interventions are conceptualized and implemented.

At the same time, challenges remain in effectively integrating experts into the discursive process. Differences in disciplinary orientations, speculative readiness, and practical constraints shaped engagement and influenced the depth of insight generated.

This research offers a meaningful step toward advancing understanding of design's role in public health and identifies key areas for future research to strengthen its impact—helping position design not only as a visual or creative practice, but also as a critical methodology for public health innovation.

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ethical leadership
a new frontier for design

Prototyping Situatedness with Radical Inclusive Attitudes

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Abstract

This poster introduces the Radical Inclusive Attitude (RIA) framework, a design research approach that decentralises the design process, shifting focus from designers to communities. Developed by the RIA collective, the framework builds on decolonising design ethics and participatory processes to address social inequalities and injustice. Inspired by Freire's Pedagogy of the Oppressed, the RIA taxonomy provides a structured methodology to explore power dynamics and inclusive attitudes in design. Through an interactive experience, the public engages with the RIA framework's key components—praxeology, phenomenology, and ontology—reflecting on their role in fostering radical inclusivity. A QR code on the poster leads to an extended digital space for deeper exploration. This initiative seeks to validate and expand the RIA framework by sparking dialogue within the design community, questioning whether radical inclusive attitudes can serve as a manifesto for ethical and impactful design practices.

Keywords: social inequalities, social welfare, complexity, radical inclusive attitudes, prototyping in action

Research objectives

This poster explores how design research is evolving to better understand the underlying factors that drive social inequalities and injustice. To address this, we introduce the Radical Inclusive Attitude (RIA) framework (Fig. 1) (Busciantella-Ricci et al., 2024), which builds on a body of literature that decentralises the design process, shifting the focus away from designers and towards communities (Udoewa, 2022; DiSalvo, 2022; Costanza-Chock, 2020). The framework aligns with the emergent ethics of decolonising design within participatory processes for complex contexts. The RIA framework emerged through a collaborative triangulation of data conducted by the RIA collective, a group formed during the IASDR 2023 design conference to explore how design can foster inclusive attitudes in society (Busciantella-Ricci et al., 2024). In 2024, the collective presented the RIA concept and initial framework at Cumulus 2024 Budapest. Building on two years of design conversations, the RIA collective now proposes a collaborative research experience. This poster invites the public to interact with the RIA framework and collective, engaging in discussions on new cultural models to address social inequalities and the growing prevalence of attitudes that incite hatred and discrimination.

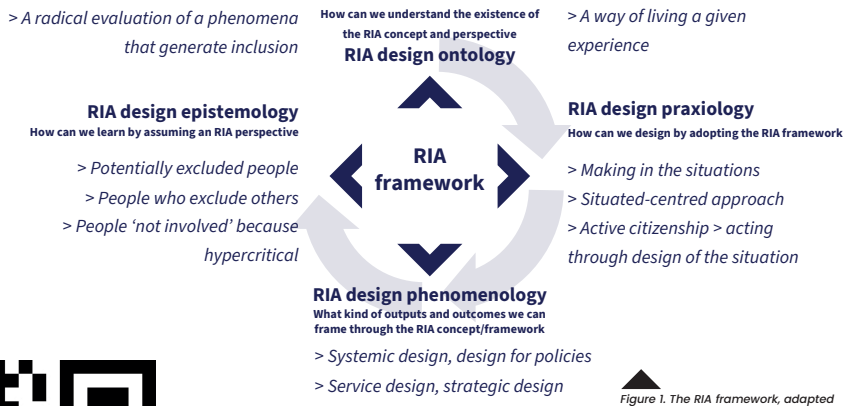

Figure 1. The RIA framework, adapted from Busciantella-Ricci et al. (2024).

www.desia.info/cumulus-2025

By scanning the QR code on the poster, participants can engage with the RIA taxonomy in a reflective digital space, following interactive instructions designed to deepen their understanding (Figure 2).

Methodology, tools and research process

To advance this objective, the RIA framework has been structured into a taxonomy that provides a practical approach to addressing the ethics of social injustice in public design. This involves creating a neutral space where RIA helps social actors—both victims and perpetrators—navigate power dynamics and inherent tensions. The taxonomy draws inspiration from Freire's Pedagogy of the Oppressed (Freire, 1970). We propose a collaborative research process where the conceptual foundations of the RIA framework are made available to the public as a performative and speculative design experience. This allows for collective reflection, validation, and contributions to the ongoing discourse around radical inclusive attitudes.
Participants will be invited to engage with the three core components of the RIA framework:

- **RIA Design Praxeology** – Triggering reflections on how individuals are or could be "making in the situation" through a situated design process to combat social inequalities and discrimination.
- **RIA Design Phenomenology** – Prompting questions about the types of design outputs being used to address these complexities. Are they appropriate? What new design disciplines are needed?
- **RIA Design Ontology** – Encouraging self-reflection on whether participants identify as potential RIA actors. Since RIA is about living a given experience, we ask: What does a radical inclusive attitude mean to you?

In connection with this framework, participants will also explore different actor typologies affected by radical inclusive attitudes, such as:

- Those who are excluded (e.g., due to discrimination, oversight, or neglect).
- Those who exclude others (e.g., individuals or systems that marginalise underserved communities).
- Those who are uninvolved but persuadable (e.g., individuals with controversial views who remain open to discussion).
- To help the public navigate the RIA taxonomy, case studies and examples will be provided, culminating in an interactive question: Who are you?

Expected results

Through this experience, the public will gain hands-on engagement with the RIA framework, applying its principles to ethical decision-making in design for social justice. Specifically, this experiment aims to test whether the RIA taxonomy can serve as a strategic tool for the design community—helping practitioners reflect on their own attitudes toward global challenges and inclusivity. Key discussion points include:

- Do participants agree or disagree with the radical approach proposed by the RIA framework?
- Can the RIA framework serve as a new design manifesto?
- How can it shape the way designers approach social change?

These questions will spark dialogue between the RIA collective and new potential RIA members, further advancing the discourse on radical inclusive attitudes and design.

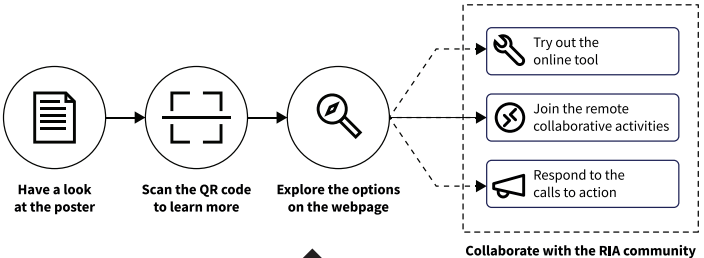

Figure 2. Steps for interacting with the poster and collaborating with the RIA community.

References

References are available through the QR code link.

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RADICAL PEDAGOGY, CULTIVATING A CULTURE OF CARE FOR ADVOCACY AND ACTION

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ABSTRACT | Design educators are at a critical juncture, necessitating the reevaluation of curricula, pedagogical practices and learning theories to provide transformative critical learning experiences that cultivate care and foster ethically oriented designers. In the words of Alistair Fuad-Luke, "[design] has the ability to catalyze societal transformations" (Fuad-Luke, 2009). Indeed, community engaged design for social justice requires an ethically oriented leader-instructor to impart a socio-culturally responsible ethos to students. While practical place-based learning in the field addressing real-world challenges can provide students skills, knowledge, and empathic capacities to be change agents, for educators' questions remain. What are our ethical responsibilities to prepare students to be resilient, adaptive, compassionate, and ethically oriented? While we understand why transition design (Irwin, Tonkinwise, and Kossof, 2015) is paramount in the academy, *how we do it* remains a vital arena for scholarly enquiry.

Radical pedagogy is the theory and praxis of community-engaged design to cultivate citizen designers. Transformative learning experiences working directly with community partners in co-creative activities toward social justice is an effective teaching modality to foster a culture of care, empathic action, and radical relatedness for a more just world. What students learn is as critical as *how* they learn. Educators can foster evolution in critical consciousness and create opportunities for students to develop an ontology of care (Escobar, 2018) and a mindset toward radical relatedness (Gablik, 1991). These ideas align well with principles of transformative critical service-learning (Coffey, Arnold, 2022) which emphasize the interconnectedness of learning, social justice, and community engagement.

As Arturo Escobar describes, “design theory and design education take place at the edges of social theory, conventionally the province of the social sciences and the humanities. It thus makes sense to affirm that the development of an ontological approach to design, one that destabilizes its comfortable niche with naturalized modern orders, demands a recentering of design education in order to bring it fully into the critical social theory space” (Escobar, 2018). This paper describes applied research in the context of design activism for human rights working directly with the National Movement for the Street Situation population (PopRua) in São Paulo Brazil. It offers a theoretical framework combining attributes of an ontology of care with critical consciousness to build a design activist mindset amplifying qualities of ethical leadership. In the place-based design program, students experience design as a co-creative process with a marginalized community wherein the relational modes of knowing, being, and doing are amplified. This is reflected in their writings as politically charged agents for social change and human rights advocates. This paper highlights the praxis and applied research of radical pedagogy. It illustrates the co-creative learning methods employed to cultivate social justice activists through design and offers a novel framework for ethical leadership.

KEYWORDS | DESIGN PEDAGOGY, ACTIVISM, CARE, CRITICAL CONSCIOUSNESS

1. Introduction

Design education is at a critical juncture, necessitating a reevaluation of curricula, pedagogical practices, and learning theories to provide transformative experiences that cultivate care and foster ethically oriented designers. In *Design Activism, Beautiful Strangeness for a Sustainable World*, Alistair Fuad-Luke highlights design's potential to catalyze societal transformations. Similarly, Ezio Manzini declares that “sustainability is a ‘societal journey’, brought about by acquiring new awareness and perceptions, by generating new solutions, activating new behavioral patterns and hence cultural change” (Manzini, 1997). This is particularly true in community-engaged design for social innovation, where the pedagogical approach demands ethically driven educator-activists who are committed to fostering a socio-culturally responsible ethos within students. In other words, the value of instilling in students an ethos of praxis and critical consciousness is crucial in developing socially responsible designers. Praxis—the integration of action and reflection—ensures that students do not merely learn design as a technical skill but engage deeply with the context and social implications of their work. Critical consciousness, as a transformative process, enables students to challenge systems of oppression and to examine the societal structures that influence the way design is practiced and experienced. By fostering this mindset, educators help students become not only skilled designers but also ethical agents of change, capable of addressing complex social issues with empathy, understanding, and a commitment to justice.

While place-based learning provides students with local knowledge and the opportunity to apply design skills to community needs, questions remain. Does the experience also deepen students’ understanding of the critical social, political, and economic issues that shape the lives of marginalized populations? Does place-based learning instill a sense of responsibility to address systemic inequities through design? These questions raise vital considerations for educators: What ethical responsibilities do we have in preparing students to become compassionate, relationally driven design practitioners?

How can we ensure that students are equipped to approach community-based design with a profound sense of social responsibility, critical awareness, and a commitment to creating meaningful, positive change? Moreover, how can we cultivate critical consciousness in students, inspiring them to take action for social justice through their design work? While the importance of transition design (Irwin, Tonkinwise, and Kossof, 2015) within academia is clear, determining how to implement it effectively in the field of design education remains a vital arena for scholarly inquiry. In the words of Arturo Escobar, “what does it mean to take seriously the insights of relationality in design work?”
To begin to address these questions, a place-based, community-engaged learning course serves as a case study to examine how students develop critical awareness through hands-on community work, how they build a sense of ethical responsibility to address social inequities, and how design education can better prepare them to become socially engaged and justice-driven practitioners. This paper presents *Design Matters in Brazil*, an international critical service-learning course in São Paulo, which engages and works with members of the National Movement for the Street Population –or preferably by members simply “PopRua”. Specifically, the paper offers a framework that combines an ontology of care with critical consciousness to foster ethical leadership in design and activism for social justice. Through co-creative, place-based learning students and faculty member engage as political agents for social change and advocates for human rights through design action, embodying a praxis of radical pedagogy. The framework is a visual tool for a pedagogy of transformative social change. It fosters ethical approaches to community-based design that empowers both students and community members to contribute to a more just world, while challenging the *raison d’être of reality* (Freire, 2013).

2. Ethical Considerations for Educators in Community-engaged Design

To equip students with a robust ethical foundation in community-engaged design, educators are advised to thoughtfully curate educational experiences that foster transformative, ethically informed learning. As educators we are privileged to guide students in developing into authentic agents of social change, preparing them to engage with marginalized and underserved communities in ways that are both inclusive and empowering. Central to this process is fostering a sense of humility and a deep respect for others' lived experiences. Educators can foster these sensibilities by creating learning opportunities that encourage students to critically examine their own positionality, biases, and reflect on the complex dynamics of power, privilege, and agency that influence their lives and design practice. This process encourages students to develop a more granular understanding of the specific challenges and ethical responsibilities involved in working with communities. In this way, students are guided to approach community engagement not from a position of superiority or paternalism, but with an openness to listen, learn, and understand the complex realities faced by others. This requires cultivating an awareness that their perspectives are just one part of a larger, more nuanced narrative and that true empowerment arises from elevating the voices and agency of those directly affected by the issues at hand. Such an approach ensures that students not only contribute meaningfully to the work but also honor the dignity and autonomy of the communities they aim to serve. By engaging with these complexities, students are better equipped to navigate the diverse, often layered needs of those they aim to serve, fostering a deeper commitment to socially responsible and inclusive design. Ann-Marie Conrado reminds us to avoid the simplistic notion of "doing good" without critically engaging with the complexities of power, privilege, and agency in our desire to support marginalized communities. For students in the *Design Matters in Brazil* course, this shift in perspective, from seeing themselves as saviors to understanding their role within a broader system of action for justice, was deepened through their learning at CISARTE (Centro de Inclusão Social pela Arte, Trabalho e Educação) and working alongside members of the PopRua. Throughout our engagement with the

PopRua, my colleague and I aimed to guide students from an ego-centric worldview to one of eco-centrism recognizing the interconnectedness of all sentient beings and the collective responsibility we have to each other and the planet. This involves the development of relational ethics (Escobar 2017).

3. Conceptual Framework

A conceptual framework became an essential tool to envision how to cultivate a culture of care that supports advocacy and action. As a working diagram, it offers an ethically grounded roadmap for community-engaged design—one that promotes care, empathetic engagement, and deep, transformative connections. The diagram (Figure 1) identifies co-merging principles and an applicable framework to transform theory into action for design activism. What students learn is as important as *how* they learn (Melsop, 2018) and educators can facilitate the development of critical consciousness, enabling students to adopt an ontology of care (Escobar, 2018) and a mindset of radical relatedness (Gablik, 1991). These principles align well with transformative critical service-learning (Coffey & Arnold, 2022), which emphasizes the interconnectedness of learning, social justice, and community engagement.

Arturo Escobar urges design educators to reconsider design's role, challenging it to transcend the traditional modern frameworks and embrace more socially conscious, critical approaches. In his book *Designs for the Pluriverse*, Escobar argues that design education must move away from the conventional, linear, and instrumental practices tied to modernity, and instead integrate critical social theory into its core. This shift, according to Escobar, calls for an ontological approach to design—one that acknowledges the relational and contextual dimensions of social realities, particularly those of marginalized communities. *Design Matters in Brazil* illustrates how the pedagogical framework, combining critical consciousness with an ontology of care, laid the groundwork for design activism and transition design pedagogy. Transition Design, as defined by Irwin, Kossoff and Tonkinwise, advocates for design that addresses complex, systemic issues by fostering long-term, sustainable change. It recognizes that the systems, cultures, and behaviors currently in place are deeply entrenched and require transformation in ways that account for the interdependencies between communities, environments, and economies. This approach focuses on developing just, equitable, and sustainable ways of living, pushing for radical, forward-thinking change.

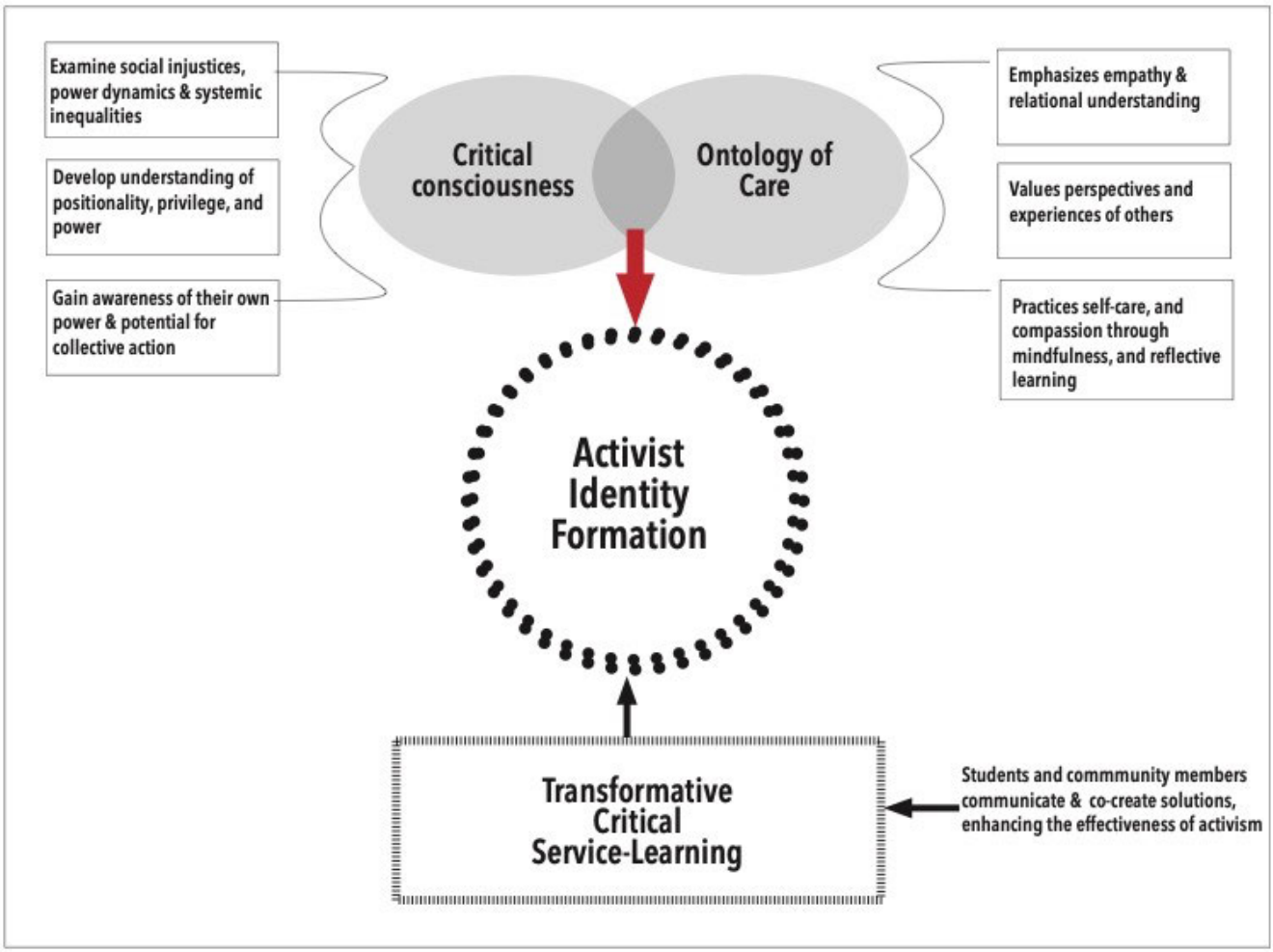

Figure 1: Conceptual Framework integrating Critical Consciousness and an Ontology of Care

4. Context and Partners in Learning and Transformation

As an international, community-engaged design-build course, Design Matters in Brazil reflects a shared vision between two university faculty members, showcasing how design can be operationalized for social and transformative change. Following months of seeding the idea for the international course and subsequent course development, an academic partnership between Ohio State University and Mackenzie Presbyterian University in São Paulo was formed. The year-long process included conversations, a series of meetings, community site visits, and coordinating efforts with Design Possível a local advocacy group for the newly formed National Movement for the Street Situation (MNPR) people.

At the time of our first meeting, MNPR was a loosely organized association of men and women who had come together in solidarity to fight for their human rights and resist the violence they faced living on the streets. In São Paulo, approximately 1.2 million people are homeless or live without adequate shelter (Rueckert, 2017) leaving them vulnerable to social indignities and limiting their access to basic human needs. In the summer of 2004, a brutal attack claimed the lives of several homeless individuals living on the streets of São Paulo (Chu, 2004). In response to this violence and driven by a determination to reclaim their human rights, the National Movement for the Street Situation (PopRua) was formed. By coming together, the unsheltered individuals were able to advocate for their rights through a collective voice. This history begins to illuminate the deep systemic challenges of racial discrimination, social inequity, and human rights violations present in the urban context. Years later—whether as a gesture of goodwill or a political move—city officials offered PopRua a vacant space to use as a day shelter. This expansive 5,000-square-meter structure was an occupiable bridge spanning

an eight-lane highway, with a four-lane road running across its roof. With determination in 2016 a small group of PopRua members began to gather there and self-organize (Figure 2), establishing an informal social network of allies and advocates to their cause.

Figure 2: Site of the design-build course, *Design Matters in Brazil*, CISARTE, São Paulo, Brazil. Photo credit: Melsop

Originally intended to house a metro stop in an urban São Paulo neighborhood, the subway line was never built leaving the vast interior space unused and prone to neglect. When PopRua began using the space it was barren and lifeless. Regardless of its physical condition, PopRua members had a clear purpose for the space; it would "help people exit street living" (Darcy Costa). The goal was to transform the space into a place of belonging, creating opportunities for social integration and community connection. As the acronym suggests, CISARTE (Centro de Integração Social pela Arte, Trabalho e Educação) encapsulates PopRua's vision for the large structure spanning the highway. In conversation, we learned they aspired to transform the space into a vibrant community hub and resource center for unsheltered people, while also providing a venue for cultural activities and social enterprises focused on long-term reintegration and social inclusion.

In conversation, we also learned PopRua envisioned a center that would provide basic needs and offer programs to help individuals transition out of street living. Their vision included creating a space where people could regain a sense of dignity, self-worth and develop new skills through educational and vocational programs. While PopRua articulated a clear idea for the use of CISARTE, they had limited resources to bring this vision to life. An additional challenge for the young organization was that only a small number of people experiencing homelessness were aware that a resource center like CISARTE existed and that basic needs could be found there.

Upon our first visit to the site, what my colleagues and I found was a vast interior with low-ceilings throughout the space. Although equipped with plumbing, kitchen facilities, and water closets, the interior was stark and underdeveloped (Figure 3). The walls were bare, painted only in white, and the floor was old, cracked linoleum tiles. During this visit, we observed broken lights, a pile of recently donated books, and an informal worker who was creatively repurposing trash into art. The space, though functional, lacked the warmth and vibrancy needed to foster a sense of community and purpose. After introductions, we sat down with the founder and coordinator of the National Movement for the Street Situation (PopRua), along with several other PopRua members, who shared their aspirations for the space. Their visions were both practical and poetic in nature. To summarize, they stated: CISARTE is intended to serve as a dynamic resource hub, offering educational workshops, skills training, and access to computers and the internet. The space is also envisioned as a platform for cultural arts and public events—designed not only to benefit unsheltered and vulnerable populations but to foster inclusion and integration for all community members. Their aspirations emphasized both immediate needs and long-term goals for social empowerment and community cohesion. Our design challenges became clear through multiple listening sessions with them.

Figure 3: Photo of interior multipurpose space before design-build projects. Photo credit: Susan Melsop

At this time, my colleague and I recognized the potential of the space as an ideal venue for community-engaged design—offering a unique opportunity to demonstrate to our students, both in Brazil and the United States, how design can be effectively used for social change. After several additional site visits, we —seeking to show our commitment to PopRua's cause—extended an invitation to its members to collaborate on an educational design-build project. We proposed that they welcome us into their space, where we could bring design to life by helping to rehabilitate the interior and support their vision of transforming it into a vibrant hub for social integration. While we were cautious not to overpromise, we were confident that with our dedication to their mission and our students' involvement we could make a meaningful contribution to both the space and PopRua's broader aspirations.

5. A Transformative Critical Service-learning Course based on Shared Convictions

Before introducing the course, the site, or the members of PopRua to students, my colleague and I recognized the critical importance of first establishing a foundation of trust and relationship with the PopRua community. For this we spent months visiting the site, meeting with PopRua members, and connecting with others supporting their cause. During this time, we also expanded our network of builders and design activists, laying the groundwork for launching a community-engaged design-build course with a vulnerable population. This phase allowed us to gain a deep understanding of their aspirations, challenges, and the socio-cultural-political dynamics at play. It also offered an opportunity to demonstrate our genuine commitment to the community's well-being and goals. By engaging authentically with PopRua members, we built mutual respect and open communication, ensuring that when students arrived, they could engage with the community in a manner grounded in the same respect, empathy, and understanding that we had fostered. Without this preparatory work, students' interactions might have been superficial or misinformed, potentially hindering the collaborative design process. Instead, by establishing a foundation of trust, we ensured that the students could contribute meaningfully and sensitively, aligned with PopRua's vision for change.

In 2017, my colleague and I launched the first *Design Matters in Brazil* (DMB) course, a critical service-learning experience that combined remote learning, community engagement, and collaborative design-build. As an international course, it presented several challenges, particularly navigating language barriers. However, we successfully brought together students from Midwest America and São Paulo, Brazil, to address the needs and aspirations of PopRua. While PopRua aimed to transform the physical space of CISARTE into a dynamic resource center and inclusive hub for both the homeless and the broader civilian population, our goal as educators-activists was to guide students in understanding how design can actively contribute to social transformation and justice from the margins.

For two consecutive years during 16-week semesters, my colleague and I challenged students to engage in a collaborative design process aimed at creating social impact. Despite the vast physical distance between our students, student teams from the States and Brazil were united by a shared conviction to design for human dignity and justice. Once students were introduced to PopRua, we employed several methods to support an ethical engagement. The first step was enabling students to self-select the type of design project they wanted to work on. While simple in nature, the pre-determined design projects of benches, bookshelves, and/or wall graphics could take any form, employ different construction methods and materials. Students' only constraint was to meet the needs and aspirations of PopRua for the interior of CISARTE.

6. Methods for Community-engagement

While I was back in the States with my students analyzing case studies of social innovation design, my colleague In Brazil facilitated onsite listening circles, fostering open dialogue and knowledge exchange between students and PopRua members. These circles created a safe, participatory space for all voices to be heard, allowing participants to share their thoughts, reflect on their experiences, and actively contribute to the design ideas for the interior space. The emphasis on listening helped ensure that the PopRua's input was not only valued but also directly integrated into each design project. Complementing this, my Brazilian colleague employed participatory action research methods to investigate both the immediate physical needs of the CISARTE space and the broader aspirations of the people. This approach ensured that design proposals were deeply rooted in the community's collective vision for the future. Through interview sessions, storytelling, and visioning workshops,

PopRua members were invited to share not only their struggles but also their hopes for a better future, forming a rich foundation for co-design.

This onsite and remote design process was structured as an ongoing reciprocal exchange. In São Paulo, students gathered insights and information from PopRua members, sharing the stories and ideas with their design teammates across the ocean to inform design decisions. Meanwhile, American students analyzed the information received and posed further inquiries for their Brazilian counterparts. Although not always a smooth exchange between teams of students working and co-designing remotely from each other, the iterative process and ongoing weekly dialogue enabled student teams to articulate, define, conceptualize, and develop design solutions that were both contextually relevant and socially impactful. These methods together helped create an environment where ethical engagement was at the forefront of the design process, ensuring that students not only contributed creatively but did so in a manner that respected the dignity, agency, and aspirations of the PopRua community.

PopRua members were not passive recipients of the designs; they were actively involved in every phase of the process. Brazilian students and my colleague played a crucial role in fostering this participatory approach by organizing co-design workshops. These workshops were specifically designed to engage PopRua members, spark their interest, and encourage their active participation in shaping the space. Through these creative sessions, students facilitated a two-way exchange of ideas, ensuring that the designs were not only informed by the community's needs but also deeply rooted in their visions, experiences, and aspirations. This collaborative, community-centered process led to more meaningful, sustainable, and impactful design solutions—while also empowering PopRua members to take ownership of the space that would ultimately serve as their resource hub.

This 10-week long remote learning and virtual design exchange culminated in a week-long immersive cultural experience constructing, and installing projects during spring break 2017 and 2018. During March, Ohio State University (OSU) students traveled to Brazil where both groups of students met in São Paulo to bring the prototypes and digital designs to life. It was pivotal moment for both student groups. For the first time, student teams met in person, refined their designs, and gathered materials. They then traveled to the CISARTE site, where OSU students gained a deeper understanding of the challenges faced by this marginalized community. The immersive, place-based experience provided students with the opportunity to collaborate intimately with PopRua members and local builders, fostering a deep understanding of the community's needs and challenges.

The co-creative sessions culminated in the design of various elements, including functional seating, tables, room dividers, and bookshelves. One project deserves special attention: a feature wall that blends utility with symbolic power. The 'poetic inscriptions' project functions as a storage wall on one side, while the reverse serves as a graphic billboard that highlights the voices of PopRua (Figure 3 and Figure 4). With permission from PopRua members, students gathered their aspirations and translated them into visible messages for all to see. These life-affirming words convey PopRua's resilience, determination, and hopes for the future. They stand as a powerful reminder to all CISARTE visitors of PopRua's vision for a more just and inclusive society.

Figure 3: PopRua members and students creating poetic inscription wall graphics. Photo credit: Susan Melsop

Figure 4: Project: Poetic Inscription Graphic Wall with Storage Space. Photo credit: Julian Bertolini

Through direct engagement with the underserved PopRua community, students were encouraged to view design not merely as the creation of products or spaces, but as a means of actively supporting the PopRua's mission for justice, human rights, and dignity. While students cannot directly dismantle entrenched inequities, challenge systemic discrimination, or fully empower marginalized communities, they can contribute by amplifying the social cause of the PopRua. Through their co-design work, they used the interior space as a canvas for transformation, creating objects and environments that directly supported PopRua's mission. Another example of this came about in the form of wall graphics. When PopRua members expressed a desire to foster a sense of belonging within the large multi-purpose space, the student team responsible for wall graphics developed several design proposals. However, none of these initial ideas resonated with the community. To better understand their needs, the students engaged in deeper conversations with PopRua members and discovered that what they valued most was simply 'to be seen.' With input from PopRua, they designed a large mural featuring photographs of organization members—giving the space a visual identity and reinforcing a shared sense of belonging (Figure 5 and Figure 6). This collaborative effort transformed the design process into a powerful tool for empowerment, using art to elevate the environment and strengthen the bond between PopRua and the broader community it serves.

Figure 5: Students making wall graphics inside CISARTE to create a sense of belonging. Photo credit: Melsop

Figure 6: Wall graphics created by PopRua and students depict desire “to be seen”. Photo credit: Juliana Bertolini

7. Reflections: From Theory to Praxis

As our students engaged directly with PopRua and collaborated with them in the building phase, my colleague and I began to observe how the design process fostered what Freire describes as *conscientização*—the development of critical consciousness. At the end of long construction days, students were eager to reflect critically on issues of marginalization, power, and inequity. Through this process, students not only became more aware of the systemic injustices that shape the lives of marginalized communities, but they also recognized the importance of dialogue, reflection, and action in transforming these conditions. By engaging with the community in this way, students came to understand that design is not merely about solving problems in a top-down manner, but is instead a shared journey of learning, co-creating, and amplifying the voices of those who have been silenced or marginalized. This approach allowed us to move beyond traditional problem-solving design strategies, embracing a more relational and ethically grounded practice that prioritizes collaboration and community agency. This exchange ultimately fostered a sense of solidarity and collective action, key principles in Freire's pedagogy, where both students and community members actively shape the process of change together.

In the words of Paulo Freire, “the more one approaches the objective, challenging raison d’être of reality through action and reflection, the more one can reveal it by entering into it.” This reflects his concept of critical consciousness and the dialectical relationship between theory and practice. Indeed, the praxis of action and reflection was integral to the community engaged course working directly with and learning alongside members of the PopRua in storytelling and creative making. It was not enough to design, build and install objects for the interior CISARTE space, it was critical -indeed radical- for us as educators and students “to penetrate more deeply the prise de conscience of the reality in which they [we] exist” (Freire, 94). Our goal was to go deeper and engage in a critical awareness (prise de conscience) of the social, cultural, and systemic realities that shape the lives of both the students and the PopRua members. In this context, radical doesn’t mean extreme, but rather it points to the need to address the root causes of the issues, to deeply engage with and understand the lived reality of the PopRua. It highlighted the need for students to not just perform design tasks but to take part in a broader, more profound process of awareness, solidarity, and transformation. Through this teaching approach, the course became an opportunity for both critical self-awareness and social transformation by cultivating care for others in their struggles to exist.

This aligns with principles of "transition design," which similarly challenges traditional design approaches by focusing on long-term societal transformation and complex, systemic change. Transition design advocates for a shift in the way design is practiced—moving away from isolated, short-term problem-solving toward a more holistic, collaborative, and ethically grounded approach. It recognizes the need for design to engage with the broader context of social, environmental, and economic issues, addressing the deep-rooted causes of global challenges rather than just their symptoms. Both Escobar’s call for an ontological approach and Irwin, et al’s framework of transition design emphasize the importance of shifting design education and practice toward a more critical, context-aware, and socially responsible paradigm. They argue for a reconceptualization of design as a tool not only for solving problems but for contributing to transformative social change. By destabilizing the "comfortable niche" of traditional design practice, both frameworks encourage educators and practitioners to rethink their role in fostering more sustainable, inclusive, and equitable futures.

8. Results and Outcomes

The objective of *Design Matters in Brazil* was to embody transition design in a pedagogical experiment. With this, the results of the course are both tangible and intangible outcomes, aligning with the course

goal to foster student development in critical consciousness and an ontology of care. The tangible results include the creation of fifteen culturally inspired projects, designed and built with the active participation of PopRua members. These included a directory and wayfinding system, kitchen tables, chairs, bookshelves, storage units, a sound-insulating curtain wall, stools, benches, and vibrantly colored wall graphics, featuring photographic images of PopRua members. The physical transformation of the CISARTE space, from barren to vital, aimed not only to provide functional objects but also to create a sense of belonging for this special community. The active engagement of PopRua members throughout each phase of the creative process allowed for co-creation and collective ownership, enhancing the sense of community and pride. These design interventions serve as tangible markers of solidarity, affirming the importance of relational care between students and community members (Figure 6).

Figure 6: Members of PopRua, students, and instructors among completed design projects. Photo credit: UK

The intangible outcomes, however, are perhaps more significant as they demonstrate how students' critical consciousness evolved through the course. Reflected in their writing journals, the transformative nature of the experience was evident. One student noted that the course “had a huge impact on my life” and expressed a newfound commitment to pursuing social justice through participatory design. This shift in perspective reveals a move from seeing design as a profession to viewing it as a socially responsible tool capable of driving social change. Another student emphasized that the course taught them to see design not merely as a profession but as a way to address hidden societal problems, underscoring the course's impact in cultivating a more compassionate, community-centered, relational mindset. These reflections indicate a deepening of students' critical consciousness, aligning with Escobar’s relationality in design and Freire's concept of conscientização—a process of developing an awareness of the social, political, and economic contradictions and acting to transform those realities.

In terms of an ontology of care, the intangible outcomes highlight a shift in students' understanding of care as not only a personal virtue but as a collective, relational practice. Through their collaboration with PopRua, students came to recognize the interconnectedness of their lives with those of others, especially those facing systemic oppression. The course helped students internalize that care is not

just about providing assistance but about standing in solidarity, advocating for human dignity, and promoting social justice. As students expressed a desire to continue working in social design, their development of critical consciousness and an ontology of care indicates that the course successfully cultivated an activist mindset rooted in empathy, solidarity, and a deeper understanding of the complexities of marginalized communities.

Today, CISARTE serves as a vital hub for both the unsheltered population and community members, fostering interaction and support. The space hosts a variety of community-based programs, public meetings, and workshops throughout the week, offering services ranging from basic needs—such as PPE distribution during the COVID-19 pandemic—to legal assistance and yoga classes. Additionally, CISARTE supports informal entrepreneurial startups, playing a key role in the Latin American social and solidarity economy.

9. Conclusion

Through Escobar's concept of an ontology of care, design students are invited to move beyond transactional design, where they solve problems without understanding the depth of context, and instead engage in a relational process where care is woven into the design process itself. This process requires deep empathy and active listening, but it also demands a reflection on the systemic forces that marginalize communities like PopRua. In this context, students saw how design can transcend the creation of objects or spaces to become a meaningful tool for empowerment and social inclusion. The direct engagement and hands-on, place-based design allowed students to witness firsthand how the co-design proposals positively impact the lives of those facing systemic hardships. By combining virtual collaboration and in-person engagement, the *Design Matters in Brazil* course offered a holistic learning experience bridging gaps between academic knowledge and social action.

In summary, an ontology of care in the context of design activism is not only about creating designs that respond to the material needs of marginalized groups but is also about fundamentally re-envisioning the relationship between designer and community. It is about respecting the humanity of those who have been excluded, standing in solidarity with them, and developing a design practice that is rooted in justice, empathy, and collective care. Through our engagement with PopRua, we –students and faculty– are not just learning design techniques—we are learning to be ethical designers advocates for human dignity, and in the process, we become activist-educators who understand the full weight of design decisions on the lives of those we aim to serve.

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RETHINKING SUPPORT FOR ELDERLY PEOPLE: CONTRIBUTION OF AN INTERDISCIPLINARY METHODOLOGY AT THE INTERSECTION OF GEOGRAPHY AND DESIGN ETHNOGRAPHY

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ABSTRACT | This article presents a methodological approach implemented as part of a doctoral research project on supporting elderly people experiencing a loss of autonomy at home. In the interdisciplinary meeting space between health geography and social design, this contribution aims to offer a critical reflection on the approach deployed to analyze the dysfunctions caused by the demographic transition and the choices made by public policies to meet the needs of the elderly. This research is based on a qualitative methodology inspired by ethnography (Nova, 2021), integrating participant observations and semi-structured interviews enriched with specific and intermediate objects (Wrembel et al., 2021). It enables the identification, mapping and analysis of socio-spatial dynamics between actors at the different territorial scales concerned (Moore, 2008). Based on case studies carried out in two territories, this work aims to question the aspirations of inhabitants, highlights their singularities (Andrès, 2017) and reveals the social and spatial practices, both individual and collective (elderly people, family caregivers and professionals) that operate at the scale of the person's living space and environment to propose tracks of reflection "as to ways of acting with and for vulnerabilities." (Châtaignier, 2023).

KEYWORDS | CARE DESIGN – GEOGRAPHY – METHODOLOGY – AGING IN PLACE – VULNERABILITY – RELATIONAL APPROACH

1. Introduction

This article is part of a doctoral research project that explores the spatial dimension of relational dynamics involved in supporting older adults who are experiencing a loss of autonomy and wish to remain at home. We propose a reflexive examination of the methodological approach, which draws on the intersection of two disciplines: design and geography.

Population ageing is one of the major challenges of the 21st century. Although it affects all countries, the dynamics of ageing vary significantly depending on national contexts (Bonnet et al., 2021). This phenomenon is intensifying due to the combined effects of several factors: increased life expectancy, declining mortality, and the gradual decrease in fertility.

In France, this phenomenon has intensified since 2011 with the retirement of the « baby boomers. » The aging of the French population is expected to continue significantly through 2040, driven by a marked increase in the number of people aged 75 and over[1]. This demographic transition raises numerous social and economic challenges. It calls for a profound transformation of the healthcare and social care systems to meet the evolving needs of older adults, shaped by aspirations and lifestyles that differ from those of previous generations. Several public opinion surveys reveal a growing desire among older people to age in place. In 2022, 94% of them reported wanting to remain at home for the rest of their lives[2].

In this context, and in response to demographic challenges, French public policies have consistently reaffirmed—since the publication of the Laroque Report (1962)—their commitment to promoting aging in place. This approach is seen as a way to preserve the dignity, freedom, and autonomy of older adults. However, it raises numerous challenges.

For older adults, aging in place involves numerous challenges. Without claiming to be exhaustive, we highlight a few key issues: these relate to their health, the evolving needs associated with the loss of autonomy, the financial costs of care, and the adaptation of their living environment. Home modifications and access to local shops and services become essential conditions for continuing to live at home. Family caregivers are also frequently called upon and must cope with significant physical and emotional strain. It is therefore essential to develop appropriate forms of support to assist them in their daily roles. Lastly, a central issue concerns the attractiveness and sustainability of care professions, which are currently facing considerable strain: a shortage of trained professionals, difficult working conditions, and a lack of recognition. All these challenges vary according to social, spatial, and territorial contexts—variation that is largely shaped by the decentralization of gerontological action, a process that, far from being uniform, results in diverse responses depending on the territory (Argoud, 2007).

This research aims to analyze, across several territories, the relational dynamics at play around the living environments of older adults. In this perspective, it seeks to explore

[1] Algava, É., & Blanpain, N. (2021). 68.1 million inhabitants in 2070: A slightly larger but older population than in 2021. Insee Première

[2] IFOP. (2022, April). Seniors' expectations regarding their place of residence: A study commissioned by ARPAVIE.

residents' aspirations and representations, to shed light on their specificities (Dautrey, 2018; Andrès, 2017), to examine how they experience aging, and to situate these experiences within the broader dynamics and interplay of actors (Gumuchian et al., 2003) operating at different scales. The objective is to identify what contributes—or could contribute—to the well-being (Bailly, 1981) of the individuals being supported, as well as their caregivers, whether professional or informal.

In order to grasp the diversity of dynamics at play and to understand the specificities of each context, we chose to conduct our fieldwork across several territories. These areas differ notably in terms of population density, the socio-demographic characteristics of their inhabitants, and the availability of services. Two study sites were selected: the Hauts-de-Seine department and the Loire-Atlantique department. This comparative approach aims to identify, through a cross-analysis, the points of convergence and divergence between these distinct territorial contexts.

The methodology used for the investigation lies at the intersection of two approaches: geography — the core discipline of this research — and design, the discipline from which I come.

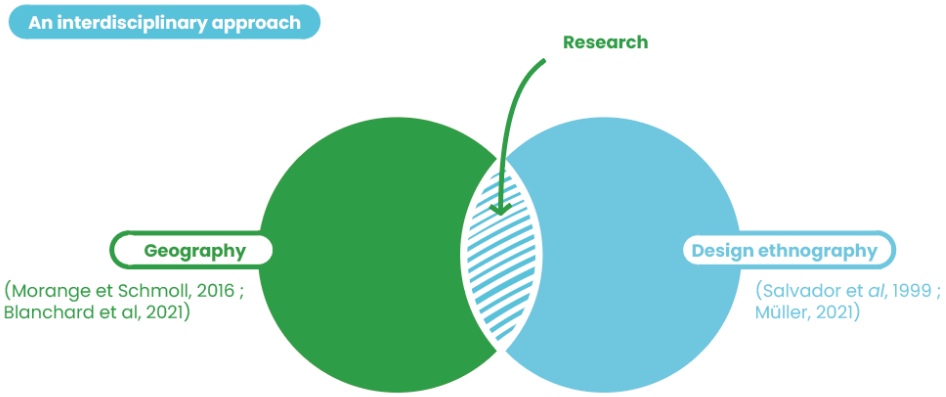

Figure 1. A representation of the interdisciplinary approach at the intersection of geography and design ethnography

Through this article, we offer a reflective analysis of the methodological approach developed within the framework of this research. Special attention will be given to the methods used, the tools developed, and the stance adopted throughout the investigation. The article explores the dialogue established between design and geography. To what extent does the integration of these two approaches contribute to renewing investigative methods with actors, shedding light on their lived experiences, and making visible the dynamics specific to each territory? We will attempt to understand how design positions itself, engages, and interacts with geography in this research process.

Several questions guided the construction of this approach. In connection with our research problem, we questioned how to listen to, collect, and present the voices of elderly people, their informal caregivers, and professionals, taking into account the uniqueness of their trajectories, the diversity of their experiences, and the multiple

relationships they have with aging. We also asked how to capture their daily lives in all its complexity, gaining access to what unfolds in the intimacy of the home — repeated gestures, rhythms, discreet arrangements. How can we understand the representations they have of their living space and territory? How can we make visible the complex interplay of actions, interactions, and territorially coordinated efforts? And finally, how can we engage in dialogue with the discourses of the different actors?

First, we will revisit the specificities of the methodological approach implemented, clarifying the disciplinary foundations in which it is rooted. We will then present the methods employed – observations, interviews, mental maps – as well as the tools that accompanied their implementation in the field. Finally, we will offer a critical discussion on the contributions and limitations of this interdisciplinary approach.

2. An interdisciplinary approach grounded in users' experiences

The field study, conducted between July 2022 and July 2024, led us to develop a structured methodological approach in several chronological stages. It followed three major phases: an acculturation phase, an exploration phase, and then a deepening phase. These different stages gradually evolved our approach. At each of them, we had to adjust the key elements of our approach, ranging from the strategies implemented to establish contact with the field to the selection of the sample, including the choice of methods and tools used, as well as adjusting our posture as a designer-researcher. These adjustments were largely influenced by the ethnographic challenges (Fassin and Bensa, 2008) encountered on site, which led us to modify our research setup.

The method relies on a qualitative approach (Morange and Schmoll, 2016). The approach was thus conceived as a constant back-and-forth between, on the one hand, the theoretical frameworks drawn from scientific literature, and on the other hand, the empirical materials collected on the field.

This process is part of a reasoning mode typical of design: abduction. This form of thought, which dynamically articulates induction and deduction, allows the object of study to be built progressively, openly, and sensitively to the complexities of reality (Catellin, 2004). It allows the emergence of hypotheses by giving a significant place to intuition, imagination, and creativity (Berger, 2017).

This reasoning mode has affinities with Grounded Theory (Glaser & Strauss, 1967), in that it considers that the field directs the questions and nourishes the analysis. Aware of the criticisms sometimes directed at these inductive approaches, we chose to use triangulation as a lever to strengthen the robustness of our approach. On the one hand, by diversifying the viewpoints collected from the involved actors; on the other hand, by combining different methods and tools to examine the same object.

2.1 A methodological approach at the Intersection of Geography and Design ethnography

Social geography enabled us to study the spatial dimension of the relational dynamics between the actors involved. As Morange and Schmoll (2021) point out, this approach uses a plurality of tools based on listening, observation, and a detailed description of lived situations, allowing for the understanding of social interactions in their spatial contexts. The objective, as emphasized by Blanchard et al. (2021), is to provide a better

understanding of contemporary societies and the daily challenges faced by individuals, with a view to improving their living conditions.

To complement this approach, we used methods from anthropology and ethnography, commonly employed by designers (Nova, 2015), in order to grasp the everyday life of actors in all its complexity. While social geography helps us identify the spatial dynamics and configurations at play, ethnography allows us to get as close as possible to the practices, routines, and adjustments made in ordinary situations. Drawing on ethnography as described by Mauss (1947), and more specifically on ethnographic design (Salvador et al., 1999; Müller, 2021) — characterized by its transformative intent — we aimed not only to document existing practices, but also to identify tensions, latent needs, and to map opportunities (Nova, 2014) with a view to designing new products or services.

To benefit from the specific contributions of each approach, we used three frequently employed methods, which we adapted to the realities of our fieldwork: participant observation, semi-structured interviews, and mind mapping. This methodological foundation was gradually enriched with other methods, such as transect walks and guided tours (Nova, 2022), in response to the demands of the field. Furthermore, we integrated visual and creative methods (Catoir-Brisson, 2018), which opened new avenues for understanding and mediation with the participants.

The methodological approach we implemented falls within a multi-scalar perspective, where scales are not seen as fixed entities, but rather as categories of practice, shaped and mobilized by the actors themselves (Moore, 2008). Our investigation was thus structured around three levels of analysis, identified based on the interactions observed in the field. The aim of this approach is to understand how the various actors — elected officials, professionals, institutions, citizens — mobilize scalar categories to frame the issues of ageing and ageing in place, assign responsibilities, legitimize claims, or prioritize courses of action.

At the micro level, our investigation focused on the living environment of the older person, including not only all the everyday caregivers (family caregivers, home aides, healthcare professionals, etc.), but also the environment they inhabit, from the home itself to nearby services and local shops.

At the meso level, we observed and analyzed the practices of the actors involved in the implementation and organization of local support services (home help services, home nursing services, orientation offices, etc.).

Finally, at a broader scale, our attention turned to the institutions responsible for political orientations and regulatory frameworks (departmental councils, regional health agencies, etc.), in order to understand how public policies shape and guide local practices.

2.2 Participant observation

Participant observation played a central role in our research. Originating from ethnological tradition, this method relies on prolonged or repeated immersion in the studied situations, thus allowing the researcher to grasp the atmosphere, the logics of action, and to become immersed in the social context in which the actors evolve. In social

geography, observation is considered an essential tool for analyzing, in situ, social and spatial practices (Morange & Schmoll, 2016). From this perspective, participant observation enabled us to analyze how actors, at different scales, appropriate and transform the spaces they inhabit or operate within. Whether referring to the older adults themselves, caregivers, or other professionals, this method allowed us to identify the modes of coordination involved in home care situations by observing gestures, words, tensions, and adjustments, which are often not verbalized during interviews.

We carried out our observations with various actors involved in home care — older adults, informal caregivers, home helpers, nursing assistants, nurses, sector managers, social workers, elected officials, etc. — which led us to invest in a wide range of places: from the homes of older adults to the premises of home care organizations, including various everyday spaces. This diversity of observation sites made it possible to grasp the actors' daily lives in all their complexity. It enabled the analysis of their professional practices within organizations, both during organized coordination meetings and informal daily exchanges, as well as during their home interventions, in a more intimate setting with the older person.

The choice of tools used for this investigation was guided by the realities and constraints imposed by the field. Several elements shaped our reflection and methodological choices.

First, the need to adapt our tools to the mobility of the care workers, who frequently move from one home to another, was a key criterion. Therefore, we favored tools capable of capturing, on the move, the different dimensions of their daily routines. Next, we made sure to design tools that could reflect, by integrating the temporal dimension, the different moments and activities of the day. This includes individuals' movements, exchanges, daily gestures as well as those specifically related to "care work." These tools were also designed to consider the range of perspectives of the various actors involved, by capturing their gestures, interactions, and perceptions at each stage of their intervention.

We used several observation tools depending on the situations encountered. The field notebook, one of the key tools in our approach, was carefully structured beforehand to facilitate our observations. It includes various elements, such as an observation guide and a journey map, allowing the data to be organized fluidly. Divided into several sections, it allows for note-taking both during and after the observation, whether in handwritten form or using a more sensory approach. Drawing, in particular, was used to depict the actors' postures and attitudes, thereby adding a visual and creative dimension to our observation.

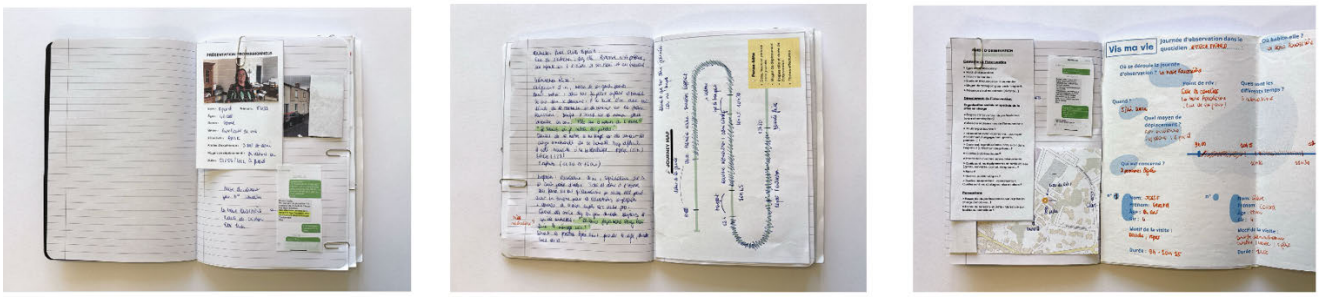

Figure 2. Photographs of the observation notebook (journey map ..)

These observations were enriched by visual tools such as photography and video, used not only to facilitate the memorization of scenes but also to illustrate the experiences and issues faced by the actors in the field. Photography, in particular, makes it possible to quickly capture daily life on the move, and thus complements the observations carried out through drawing.

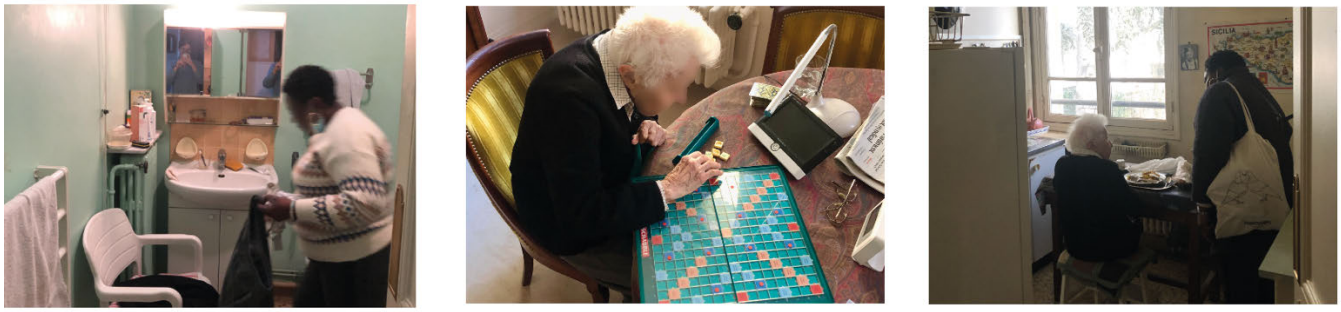

Figure 3. Photographs of the observations

Finally, we included pre-filled observation sheets to record the different times of coordination and consultation between actors at various scales. These sheets aim to identify the participants, the topics discussed, any divergences, as well as the modes of exchange (verbatim, dialogues, postures, etc.) and the solutions considered. To enrich our observations, we chose to conduct semi-structured interviews, forming the second pillar of our investigation framework. These interviews took various forms depending on the contexts.

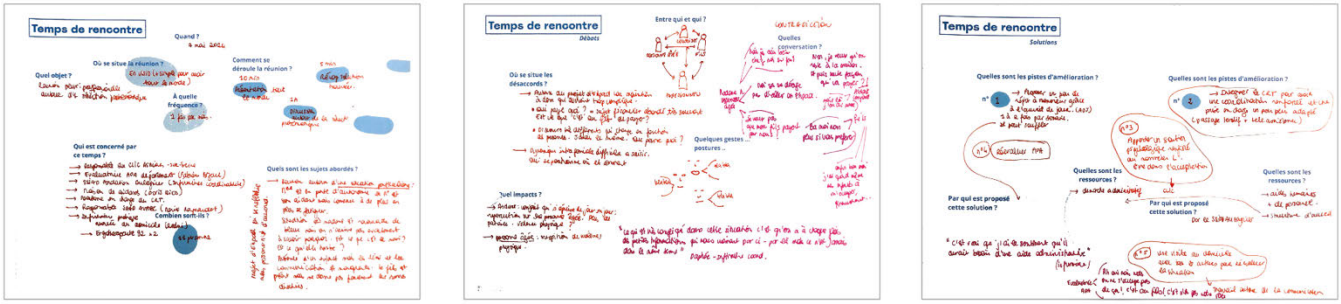

Figure 4. Photographs of the pre-filled observation sheets

2.3 Interviews

In total, 89 interviews were conducted at different scales of observation. Thus, with so-called institutional actors, we carried out standard semi-structured interviews. In contrast, with field professionals, family caregivers and older people, the interviews took more the form of life stories, in the sense that these participants shared their “lived experience” (Bertaux, 2016). Moreover, with some professionals, limited availability led us to replace — or complement — formal interviews with informal conversations, gathered during participant observations.

Like participant observations, the interviews were conducted in a variety of contexts, to adapt to individuals’ constraints and preferences, and to foster conducive exchange

conditions. To address availability challenges, we also offered videoconferencing as an additional option.

We thus left participants free to choose the setting of the exchange: at home, in public places (cafés, parks…), at their workplace, alone or accompanied. In some cases — especially when dealing with distrustful participants (older people) — the interviews were conducted in pairs. These modalities were adjusted according to the profiles encountered. With family caregivers, interviews were conducted, whenever possible, outside the home or in the absence of the person being cared for, to allow freer expression. For professionals, travel time sometimes provided the setting for informal discussions about their working conditions. Interviews with older people mostly took place in their homes. The home is, in fact, a space of intimacy and reflexivity, conducive to personal expression. It is, as Serfaty-Garzon (2003) points out, a place of self- knowledge, of one's capacities and responsibilities — a privileged setting for understanding how individuals inhabit their daily lives.

2.4 Time of arpentage

Given the heterogeneity of situations encountered in the field, we chose to include a methodological step prior to the interviews: a time of arpentage (Nova, 2022), conceived as a preliminary phase aimed at exploring each actor's environment through the use of all our senses (sight, hearing, smell, etc.). The goal was to anticipate future interviews by developing an initial sense of proximity with the person and their living environment. This arpentage, conducted both remotely and on site, consisted of walking through the area to grasp its sensory features. At the end of each exploration, a "sensory map" of the environment was produced. This visual tool proved particularly useful in contextualizing the observed situations and refining the analysis of the later interviews. Remotely, this step used geographic tools (Géoportail, Géoclip, etc.) to establish an initial territorial diagnosis. On site, the exploration was done on foot, for about thirty minutes, guided by a field notebook, maps, and a guide of arpentage.

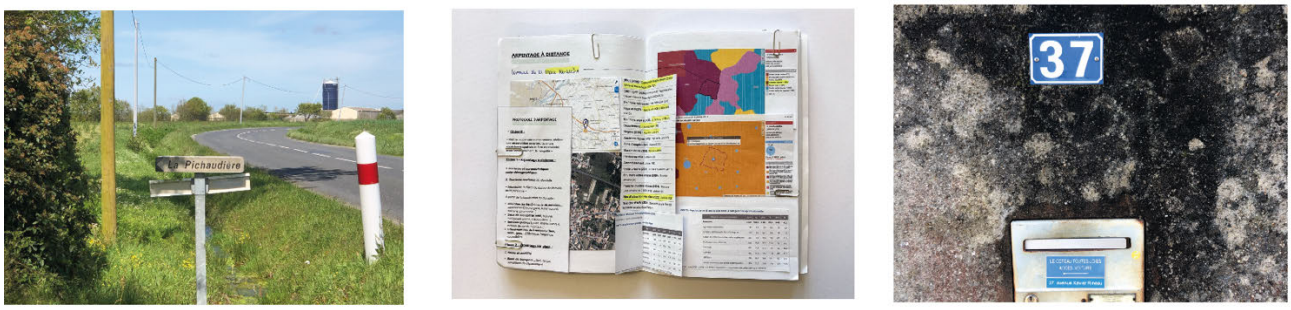

Figure 5. Photographs of the arpentage

Following this step, we focused on conducting semi-structured interviews. These lasted between 20 minutes and 3 hours and 30 minutes, depending on each person's availability and disposition. The conversations were guided by interview guides, designed as flexible frameworks to structure the discussion while allowing for spontaneity and adaptation to the specificities of each situation.
To encourage individuals to express themselves and to foster trust, several creative and visual tools were used (Catoir-Brisson, 2018). Initially, all interviews were conducted using paper interview booklets, similar to the observation notebooks. This methodological choice followed concerns expressed about the use of computers, which some

participants perceived as intrusive. The notebooks also allowed for the insertion of photographs, used to illustrate or enrich the information gathered, and compared with the sensory maps produced during the arpentage phase.

For older adults and caregivers, the game Dixit was used as a conversational entry tool to help initiate dialogue and create a setting conducive to speaking. By engaging the imagination and emotions, it enabled participants to talk about what they appreciated in their daily life and how they envisioned "home." This approach was introduced in response to difficulties encountered at the beginning of some interviews, when certain individuals would spontaneously say: "I have nothing to tell you." This phrase, heard on multiple occasions, reflected a form of hesitation toward the act of narrating one's own experience — something the game was specifically intended to ease.

Figure 6. Photographs of the Dixit game used during the interviews

Moreover, mapping was used as an intermediary object throughout the interviews, in line with the work of Bassereau et al. (2015). Maps of the territory, printed at different scales, were presented to the participants in order to illustrate their statements and to better understand their spatial practices. This tool proved particularly useful for facilitating discussions with older adults, caregivers, and professionals, by making their movements, landmarks, and territorial anchors visible.

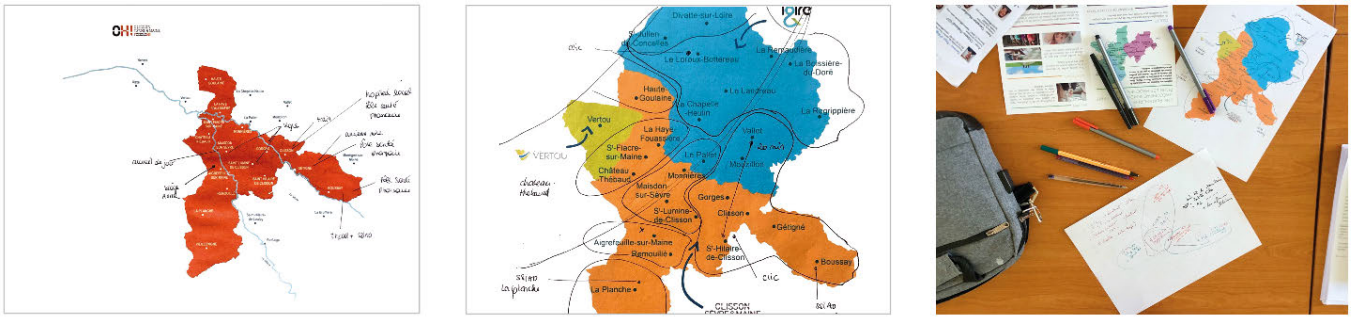

Figure 7. Photographs of the intermediary objects used during the interviews

In order to confront the discourse of older adults with their actual practices, we supplemented the interviews with commented walks. This method allowed us, as Nova (2022, p. 109) points out, "to question the potentialities and constraints offered by the person's environment." By accompanying them in their daily lives, we were able to concretely observe the difficult situations they face.

Finally, we used the mind map as a spatializing technique during the interviews. This

approach aimed to gather a graphic and spatial representation of the territory, as perceived and experienced by the participants. By providing a medium to bring different representations into dialogue, the mental map fostered a richer and more nuanced understanding of the lived environment. Lynch (1960), a key figure in the field, greatly contributed to the development of this method, demonstrating the legitimacy of visual analysis of the urban landscape. We applied Lynch's technique by presenting participants with a blank A4 sheet of paper, on which they could draw their own vision of their territory. The instruction given was: "Can you represent, through drawing, your territory?" A total of 43 mental maps were collected.

Figure 8. Photographs of the mind maps used after the interviews

The articulation of the different methods was adapted according to specific contexts and the actors involved, which led to variations in the order in which they were applied. During our investigation with professionals, interviews were conducted first, in order to gain an initial overview of the situation before planning the observations. In contrast, for older adults, who were more apprehensive about our presence, we first established a connection through observations carried out during the home visits of professionals. These moments allowed us to become part of their daily lives and to create an initial relationship of trust. Once this relationship was established, we were able to plan and conduct the interviews. This approach was facilitated by the support of field professionals, who played a key role in helping us make contact with older adults. Finally, although the mental maps were initially planned for a separate time, they were ultimately carried out following the interviews, due to time constraints on the part of the actors involved.

Furthermore, our posture as designer-researchers evolved over the course of the investigation, depending on the situations and individuals encountered. Faced with often challenging contexts—whether professionals dealing with difficult working conditions, exhausted caregivers, or vulnerable older adults—our involvement sometimes went beyond traditional methodological frameworks. During observations with professionals, we chose to become deeply involved, in order to understand their daily lives as closely as possible and to acknowledge the physical and emotional burden of their work. Conversely, during formal or institutional exchanges, a more distanced posture was adopted, allowing for attentive listening without disrupting existing dynamics. This variability in posture also manifested itself during interviews and the creation of mental maps. These moments of exchange often led to a form of personal, emotional, and relational engagement, fully mobilizing our presence. This approach aligns with a form of participant observation as described by Jeanne Favret-Saada (2009), where the researcher no longer merely observes from the outside, but becomes personally affected. Finally, supporting the mental map exercise also required adaptation depending on the

profiles encountered. Some participants, particularly among the older adults, needed more active support: in such cases, it involved drawing together a visual representation of their relationship to space, based on the verbal exchanges we had. Here again, the adopted posture was one of attentive engagement, aiming not to impose a framework, but to co-construct a sensitive trace of their lived experience.

3. Contributions and limitations of the methodological approach

At the end of the presentation of our methodological approach, it is necessary to highlight the specific contributions of this work, as well as its limitations. We will pose the following question: To what extent does this interdisciplinary methodological approach renew perspectives on supporting ageing at home?

This approach gradually took shape as a form of methodological bricolage (Nova, 2015), characteristic of ethnographic practices in design (Hirt et al., 2015). It combines approaches from geography and ethnography, in a perspective nourished by care thinking (Tronto, 2009; Dautrey, 2018), in order to explore new ways of supporting older people at home, within a logic of "taking care" as described by Andrès (2017). This work was grounded in careful attention to the vulnerabilities of the individuals encountered, which became a decisive lever for transforming our relationship to the field, rethinking our investigative tools, and adjusting our research posture. This methodological positioning echoes the work of Marine Royer and Denis Pellerin (2022), who analyse how a care ethics integrated into design practices leads designers to adjust their presence in the field.

It is precisely in this ability to access the intimacy of lived situations—often made invisible (Avril et Schwartz, 2014)—to establish dialogue with a diversity of actors, and to make visible the dynamics at play in supporting ageing at home that the major contributions of this work lie.

A first contribution of this research lies in the way the articulation between approaches and postures enabled us to "settle into an environment" (Royer & Pellerin, 2022, p. 129), by gradually becoming embedded in the living contexts of the people we met.

This embeddedness was facilitated by the diversity of methods and tools mobilised, which multiplied entry points into the field. By relying on intermediary actors, especially home-based professionals, and by varying modes of contact (phone calls, emails, direct meetings…), we were gradually able to establish a relationship of trust, a key condition for continuing the investigation. This approach also made it possible to cross perspectives on the same situation, thereby revealing the singularities (Andrès, 2017) of each context. This work paves the way for developing responses adapted to local needs. However, within the time constraints of the doctoral project, this research currently focuses on identifying needs and highlighting points of tension. A follow-up study would be necessary to initiate a process of designing interventions and analysing their reception within the investigated contexts.

The involvement of stakeholders in the field was also made possible by a careful adaptation of the inquiry conditions. By allowing individuals to choose the location, timing, and presence or absence of their relatives, we were able to create a climate of trust, conducive to the expression of their feelings.

This atmosphere was also strengthened by the adaptation of our research posture. A posture grounded in understanding and reciprocity, as Bilger (2023) highlights in her fieldwork account, stressing the importance of finding the right tone and pace to welcome the emotions of participants, particularly when dealing with sensitive topics (Fresia et al., 2006). This availability allowed participants to express themselves freely, sometimes revealing their emotional burden. However, this posture is not without its challenges: as Elisa Wrembel (2023) reminds us, it requires navigating between empathetic listening and maintaining the structure of the interview, which can be delicate when participants feel the need to share personal experiences.

Furthermore, while this research relies on a diversity of methods and tools, as well as a flexible and evolving inquiry posture, these methodological choices also present certain limitations. The main issue concerns their replicability: although the situated nature of this work is one of its strengths, it may make it more difficult to transfer the approach to other research settings. Moreover, this approach, particularly time-consuming, requires significant on-site engagement, which is not always easy to sustain.

A second contribution of this research lies in the methodological approach itself, constructed through an interdisciplinary dialogue between geography and design. This articulation enabled a different perspective on existing investigative tools by integrating sensitive and creative methods capable of revealing dimensions that are not easily accessible through traditional approaches. Similar to the work of Marine Royer, who uses drawing as an observational tool in medical contexts from an anthropological perspective, design here has been used as a fully-fledged investigative practice. It enabled not only the collection of forms of knowledge but also the design of intermediary objects to facilitate participant engagement and the researcher's acceptance in the field (Mourat et al., 2015).

First, the use of visual and creative tools was a lever to encourage dialogue and foster participant expression, as shown in the work of Catoir-Brisson (2018). These tools, specific to design practice, open the door to new forms of innovation (Catoir-Brisson & Royer, 2017). The *Dixit* card game we used aligns with this logic. As a "creativity support" (Zaïdi, 2024, p.257), it helped initiate dialogue and explore the imaginaries of older people and their informal carers. In addition, maps of the local territory were used as a medium for expression, enabling participants to concretely represent their movements and habits. These tools, based on an accessible visual language, helped generate a more detailed understanding of their daily lives, echoing the observations of Bassereau et al. (2015) on the value of intermediary tools in fostering exchange.

However, these methods are not without limitations. Their unusual nature can sometimes unsettle participants or even provoke rejection. This was the case with the Dixit game, which some older participants criticised as infantilising. In such situations, far from encouraging dialogue, these tools may interrupt it. Moreover, the use of certain techniques, such as the mind map, also requires adjustments. It did not prove suitable for all audiences, with several older individuals expressing discomfort or refusing to take part in this exercise. It would be worthwhile, in future work, to explore the conditions for appropriating these formats in order to improve their reception.

More broadly, this is one of the limitations of this methodological approach: because it was built in an evolving manner, certain adjustments were made late in the process and could not be fully explored or tested.

A second key point lies in the richness of the interdisciplinary dialogue between

geography and design, which allowed for the articulation of complementary tools from both fields. This articulation opened new ways of sensibly apprehending the social and spatial realities of ageing at home (Coblence & Pallez, 2015). It contributed in particular to revealing often invisible elements or tensions within the organisation of support among the various actors involved. In this perspective, drawing and photography proved to be relevant media for documenting ordinary situations, capturing atmospheres, or conveying the intimacy of the home. This use of visual media to render complex experiences perceptible is in line with approaches already explored in other design studies, such as those of Loélia Rapin (2024), who proposes a sensitive and situated reading of lived experiences through these forms of expression.

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Service Design and Local Welfare: boosting Coordination Strategies between PAs and Communities.

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ABSTRACT | Exploring the theme of improving access to local welfare services, this ongoing research aims to use service design practices as an innovative tool to help Public Administrations (PAs) offer new service design models that are more effective, distributed, and responsive to the needs of individual territories. By analyzing three relevant forms of engagement in service design – civic activism at the micro, advocacy in umbrella institutions at the meso, and knowledge circulation and capacity building in European multi-actor bodies at the macro – it explores whether multi-level coordination can empower citizens to effectively advocate for increased access to welfare services and become key interlocutors for territorial development and the redistribution of essential services. In practice, the research analyzes the dynamics present in internal areas, i.e. those territories characterized by the difficulty of access to services, and therefore ideal for highlighting systemic challenges and potential solutions, to activate new experimental approaches and detect new ways of intercepting resources in an autonomous but coordinated way. This research aims to establish a framework for how service design can guide, systematize, and replicate policies that effectively redistribute essential services by enhancing communities; at the same time, through multi-level coordination, it seeks to enhance PA to enact more impactful and targeted policies.

KEYWORDS | SERVICE DESIGN, PUBLIC ADMINISTRATION, MULTI-LEVEL GOVERNANCE, RURAL AREAS, POLICY DESIGN

1. Introduction

In the context of increasing disparities in the distribution of essential services, particularly in Italy's rural areas[1] (SNAI, 2013), this research aims to explore the potential of service design as a strategic framework for enhancing the capacity of Public Administrations (PAs) (Gieske, 2018) at regional and local level to implement effective and targeted policies. In line with the objectives outlined in the Territorial Agenda 2030, which seeks to create sustainable models that are replicable on a European scale for service delivery, the General Objective (GO) of this study is to identify best practices for integrating the role of the service designer in the public sector into public policies. This is to be achieved through the development of a multi-level coordination model that promotes community empowerment among stakeholders, ultimately supporting PAs in implementing more effective and targeted policies aimed at redistributing essential services. Furthermore, the research aims to derive actionable insights on how local needs can be better aligned with European policy objectives, thereby contributing to a more equitable distribution of essential services.

This research ongoing addresses several key Research Questions (RQs):
RQ1) How can service design principles be integrated into public policy formulation to improve service delivery in underserved areas?
RQ2) What are the service design's mechanisms through which multi-level coordination can be achieved between PAs, civic activism and European bodies?
RQ3) What outcomes can the implementation of a service design framework yield in terms of improving access to services?

2. Context

Situating this research within both national and international contexts, specifically in Italy and Europe more broadly, and analyzing the macro-trends outlined by the Organisation for Economic Co-operation and Development (OECD), we observe the erosion and uneven distribution of essential services and institutions across the territory (Eurostat, 2024). This research focuses on territories characterized by low population density and distance from essential services—referred to as "internal areas" in the Italian context (SNAI, 2013). These areas serve as case studies where significant challenges emerge, including limited job opportunities, inadequate infrastructure in energy, transport, and information and communication technology (ICT), and restricted access to essential public services, such as healthcare and education (Eurostat, 2024). As highlighted by Barbera et al. (2018), the situation in Italy, marked by the scarcity and uneven distribution of essential services, mirrors similar trends observed across the European landscape. To identify potential avenues for improvement within this scenario, this research aims to contribute to the rebalancing of territorial development, aligning with the common European goals articulated in the Territorial Agenda 2030 (2020).

Following the initiatives proposed in Italy for the development of policies for internal areas, the Barca Report (2009) is cited, which enabled the implementation of the National Strategy for Internal Areas (SNAI, 2013). Among the various trajectories for improving the

[1] In Italy, rural areas are referred to as 'internal areas': regions that are significantly distant from centers offering essential services such as education, healthcare, and transportation. These areas are rich in important environmental and cultural resources and are highly diverse, shaped by both natural features and centuries of human influence.

current situation, the adopted approach shifts away from top-down policy design, favouring instead co-design processes involving active local stakeholders and a place-based logic, with investments in infrastructure, services, and human capital in the most disadvantaged areas. In this framework, a set of pilot areas was selected to initiate problem-solving pathways. Despite these initiatives, the SNAI itself, designed to integrate funds and projects, has encountered several forms of failure (Cersosimo and Licursi, 2022). Among these, the persistence of sectoral constraints emerges, such as the use of competitive calls for proposals, which risk excluding municipalities with limited planning capacity (Zabatino and Carrosio, 2022), and the lack of truly shared planning actions, where participation is often driven merely by the opportunity to access funding (Zabatino and Carrosio, 2022; Cersosimo and Licursi, 2022). Furthermore, following the pandemic, substantial resources were allocated at the national level through instruments such as the National Recovery and Resilience Plan (NRRP), the Complementary Fund, and React-EU. As reported by Canesi (2023), particularly during this year, significant difficulties have emerged in responding promptly and effectively to the many national and European calls for new projects aligned with EU directives and objectives. Moreover, available data indicate that Italy is less competitive in accessing indirect EU funds due to the complexity of procedures, a limited culture of European project planning, a shortage of qualified personnel, and challenges in building international partnerships ("European Funds: What They Are and Why Italy Is Struggling to Access Them", n.d.). Finally, PAs have been observed to frequently lose sight of citizen-defined priorities throughout the complex processes involving multiple stages and levels of governance (Ianniello et al., 2018). In light of these challenges, it is becoming increasingly necessary to demonstrate how Service Design in the Public Sector (SDPS) can serve as a key field (Bason, 2017) for overcoming the structural and procedural obstacles that continue to hinder effective policy implementation.

3. Local Governance and Coordination in Marginalized Areas

Reflecting on the importance of the distribution of economic activities and the presence of public services and infrastructure for population concentration and national development (OECD, 2022), sparsely populated areas could be an opportunity to rewrite policies (Barbera et al., 2018, p. 11) not merely focusing on delivering more services, but completely rethinking the way public services are designed, managed, and delivered; where new forms of governance that take into account needs expressed from the grassroots can be identified; innovating more broadly in policy models by co-designing with local communities, experimenting with tailored solutions, and find models that can be replicated elsewhere.

The analysis of key systemic archetypes featured in the 'Systemic Design Toolkit' (Jones and Van Ael, 2022)—such as 'Success to the Successful', 'Shifting the Burden', and 'Eroding Goals' [see Figure 1]—reveals recurring patterns that characterize many of the critical issues within complex policy systems, such as those affecting internal areas. These archetypes illustrate how success tends to reinforce itself where capabilities and coordination are already present (Success to the Successful), while elsewhere, temporary solutions are adopted that fail to address underlying causes (Shifting the Burden), or goals are progressively lowered to match underperformance (Eroding Goals). In all cases, the same systemic matrix emerges: a lack of metagovernance—that is, an overarching level capable of effectively coordinating the various actors and instruments involved; the

absence of relational infrastructures that could facilitate collaboration across institutional levels; and insufficient investment in local capacity building, which further exacerbates operational inequalities between territories.

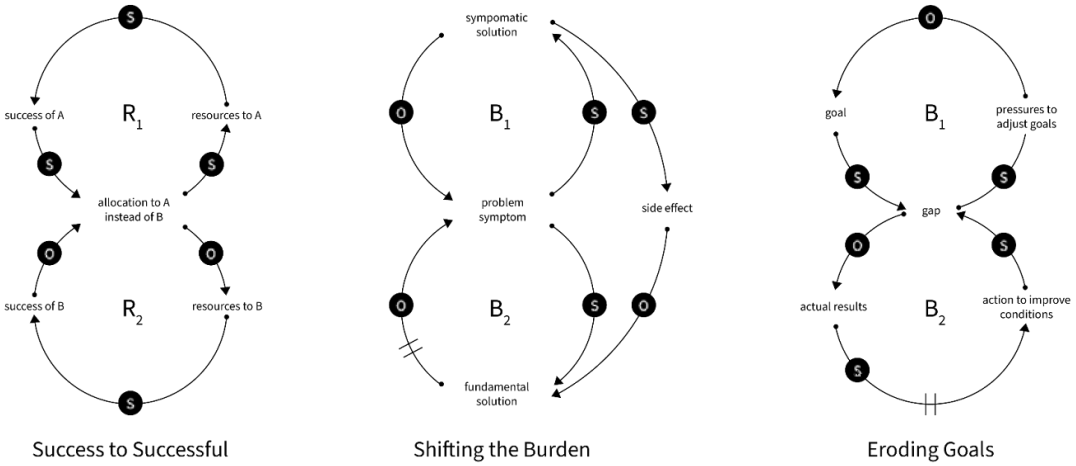

Figure 1. Systemic archetypes present in the Systemic Design Toolkit. [Resource: Jones and Van Ael, 2022]

Analyzing the closely observed case study of 'Montagna Fiorentina', which involves the neighboring municipalities of Londa and San Godenzo, it becomes evident that small territories — despite having limited economic and administrative resources, have succeeded in accessing European NRRP funds. This experience demonstrates that the successful mobilization of resources and engagement of civic activism at the local level depends on institutional vitality. At the same time, operational weaknesses and the complexity of top-down administrative procedures — as occurred with the management of SNAI funds — have led public administrations to adopt a middle-up approach. Within this framework, PAs have managed to: establish strategic collaborations with experts in the design and management of European funding; actively involve the local community in defining project priorities, thereby enhancing the relevance and effectiveness of the interventions; and include stakeholders from the local economy, introducing targeted measures to support businesses within territorial regeneration projects (Montagna Fiorentina, n.d.). Such redistributive approaches remain exceptional and tend to emerge within a fragile institutional system that is difficult to replicate.

Focusing the analysis on the adoption of a bottom-up driven approach, in territories such as internal areas, niches of social and civic innovation, such as those described by Geels and Schot (2007) in their socio-technical transition theory, rarely succeed in evolving into actual trajectories of change. Especially in the Italian context, these niches often encounter fragmented administrative environments which, in most cases, lack the systemic conditions necessary to pursue and channel civic demands. As a result, the trajectory is interrupted before the innovation can be institutionalized. The multi-level research framework proposed in the following chapter aims to develop findings that contribute to the construction of a regime capable of accommodating innovations, thereby fostering an institutional context that is receptive to transition.
Through the integration of the two approaches described above — on the one hand, fostering the systematization of the middle-up approach, and on the other, creating enabling environments for the recognition and affirmation of innovation niches — this research aims to strengthen the coordination strategy understood in terms of alliance. This notion of alliance refers to the combined capacity to allocate resources from above

and to interpret and articulate resources from below.

4. Research Positioning: Service Design to fill the Coordination gap in PAs

In recent years, the discipline of design has gained greater prominence within the context of public policy, integrating creative and experimental practices into governmental processes (Mintrom and Luetjens, 2016). Specifically, the discipline of SDPS recognizes the need to more actively account for multi-actor dynamics and interdependencies within complex service systems (Sangiorgi et al., 2017). This stands in contrast to traditional views of service design, which often overlook the institutional arrangements and interdependencies that influence the entire service system. Aligning with the heuristic outlined by Kimbell (Kimbell, 2023), this research delineates various ways in which design can influence the policy process and be utilized for diverse purposes in relation to policy formulation. Situating this research within the relationship between design and public policy, we position ourselves within the domain of design as a tool for policy-making, drawing inspiration from models defined within the service ecosystem design [see Figure 2].

RELATIONSHIP BETWEEN DESIGN AND POLICY-MAKING	Whose/what knowledge	Who are the designers?	Examples	Relationship to design research literatures
Design as a tool for policy-making	Narrow recognition of different forms of knowledge useful to the policy process	Policy-makers and professional designers	Design toolkits	First and second-generation design methods, service design
Design as a practice of improvising within policy-making	Inclusion of specific and explicit kinds of knowledge/co-construction of knowledge	Policy-makers and designers, plus users/those with lived experience of a given policy issues	Living labs	Partecipatory design, service design
Design regenerating policy-making	Hidden, unknown, occluded knowledges	Inclusive/wide recognition of different knowledges and perspectives	Creative futuring	Anticipatory/ speculative design, service ecosystem design, transition design

Figure 2. Description of the research's positioning within the relationship between design and policy-making. [Resource: Kimbell 2023]

Adopting a systemic view of the service ecosystem, this research takes as its starting point the study by Vink et al. (2021), which focuses on shaping institutional arrangements and their physical enactments by collectives of actors to facilitate the emergence of co-created forms of value. As a theoretical starting framework, we specifically examine the model referred to as the "Multi-level process model for service ecosystem design" [see Figure 3], which analyzes the dynamics of the actors involved in service processes at the micro, meso, and macro levels, taking into account institutional arrangements with a view to achieving long-term change. The study states that its objective is to lay the theoretical foundations for future empirical research based on the proposed model, while the future

research directions suggest the development of methodological tools to measure such impacts.

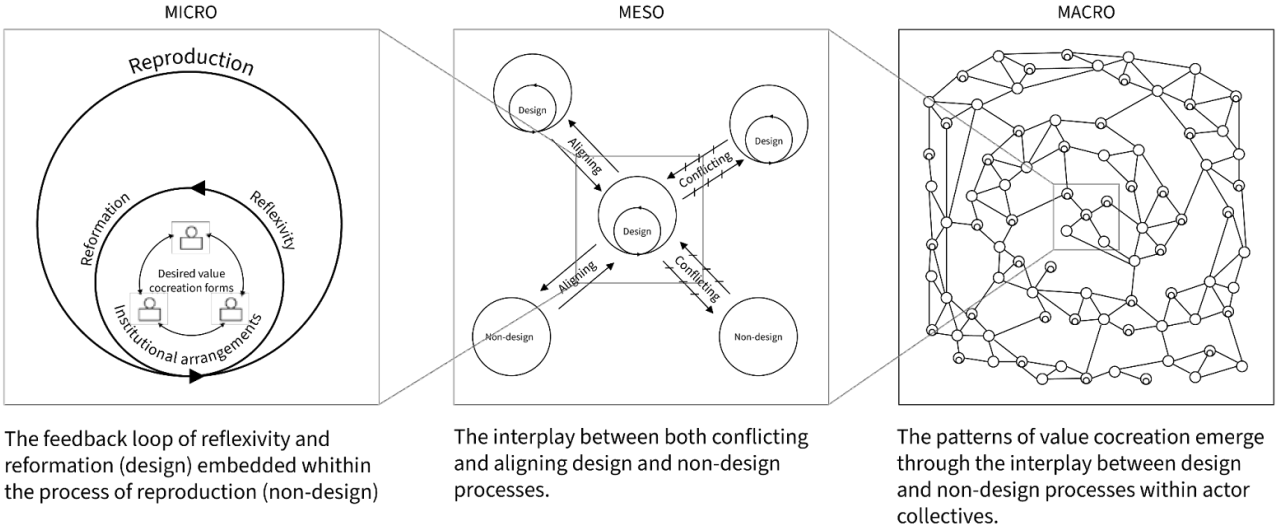

Figure 3. [Resource: Vink et al. (2021)]

To establish an initial systematization of the three levels of involvement in the definition of policies, programs, and projects that activate services within a territory, this research focuses on the meso level of the model. This level is identified as a key phase in which the designer, through the interaction between design processes and non-design processes—understood as the dynamics through which actors reproduce existing institutional arrangements without intentionally seeking to change them (p. 178)—can co-create broader value patterns, as defined at the macro level.

To represent the multidimensionality and complexity of the governance process, each level influences the activation of services within the PA system in a systemic logic, leveraging the potential of their respective tools and connected resources in an autonomous but coordinated manner [see Figure 4]. The following list is expressed in bullet points to emphasize its non-hierarchical, interconnected, and iterative nature:

- Micro level: Individual civic activism stimulates action at other levels and contributes to defining the needs and priorities of the territory.
- Meso level: Umbrella institutions serve as intermediary bodies bridging European policies and local needs. Through advocacy, they translate citizen needs and European best practices into concrete actions, promoting co-participation. Furthermore, they collaborate with PAs to adapt policies and programs to the specific needs of the territory.
- Macro level: European multi-actor bodies are responsible for disseminating best practices and capacity building. They contribute to defining general policies and strategies at the European level.

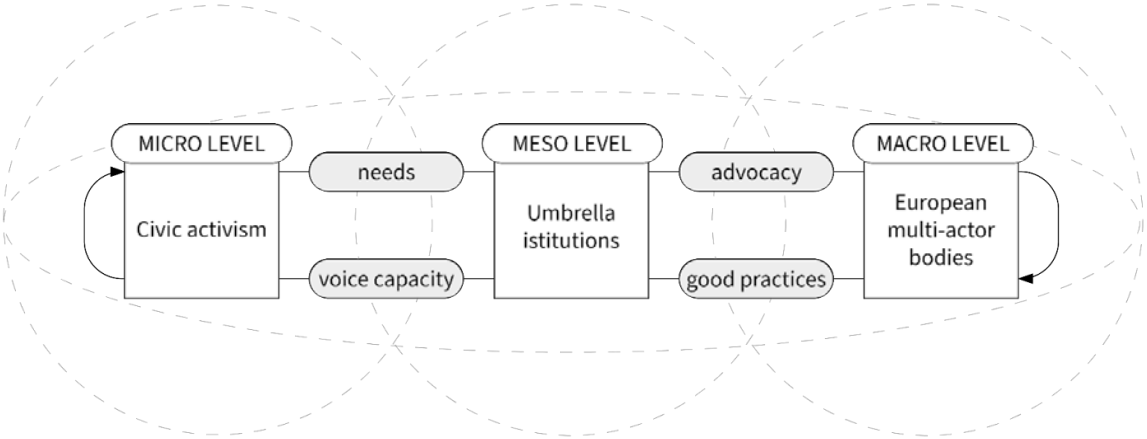

Figure 4. [Resource: Authors. The model was developed in collaboration with Economics Professor Marco Tognetti.]

5. Research Proposal: a Multilevel Coordination Strategy

This research proposal focuses on structuring a new model to redistribute agenda-setting power, leveraging already existing communities empowerment practices to design policies that are more effective and relevant for the communities themselves. In fact, if communities engagement is a well known design research field since years, the model aims at serving and improving the specific action of translating the indications of community engagement practices into effective policies, thus achieving more impactful and targeted policies through a better multi-level coordination [see Figure 5].

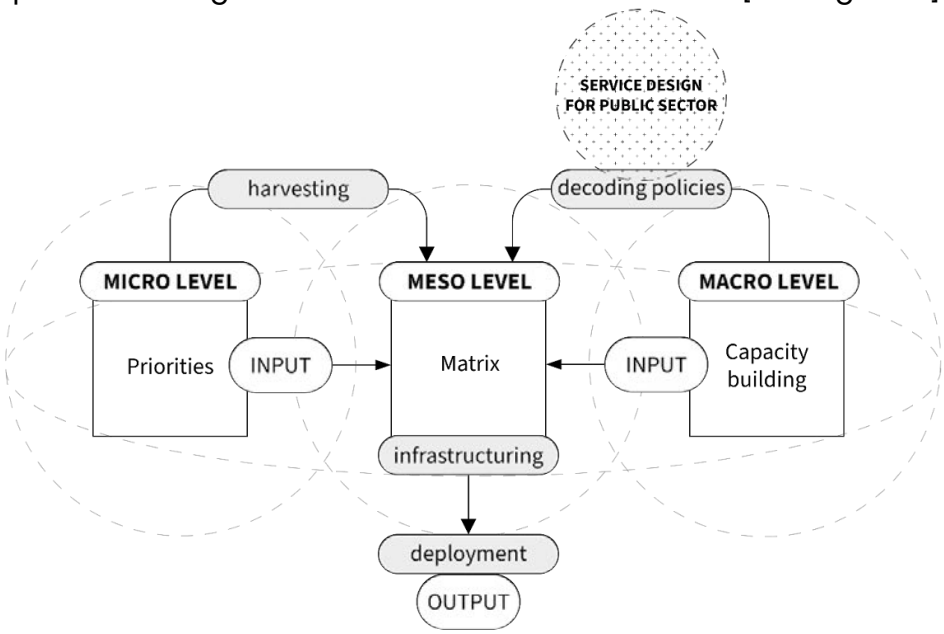

Figure 5. [Resource: Authors. The model was developed in collaboration with Economics Professor Marco Tognetti.]

The proposed design process, also referred to as the research framework, is divided into five phases:

1) Analyze, via desk research, the input provided by:

- Micro level - civic activism: acquire reports providing information on territorial needs and intervention priorities;

- Macro-level - European multi-actor bodies: calls for proposals outlining methods for resource acquisition.
  To grant meso-level access to resources, the completion of key issues is required to identify project objectives, activities, impact, and value;

N. Define a matrix to structure the impact and connections among the determining factors in the classification of policies. In order to improve the concept of coordination, through studies and collaborations with public administration practitioners, the objective is to identify a correlation coefficient between key issues defined at the micro level and priorities identified at the macro level. Correlation studies by Taherdoost (2022) are used to provide a graphical representation of the concept [see Figure 6].

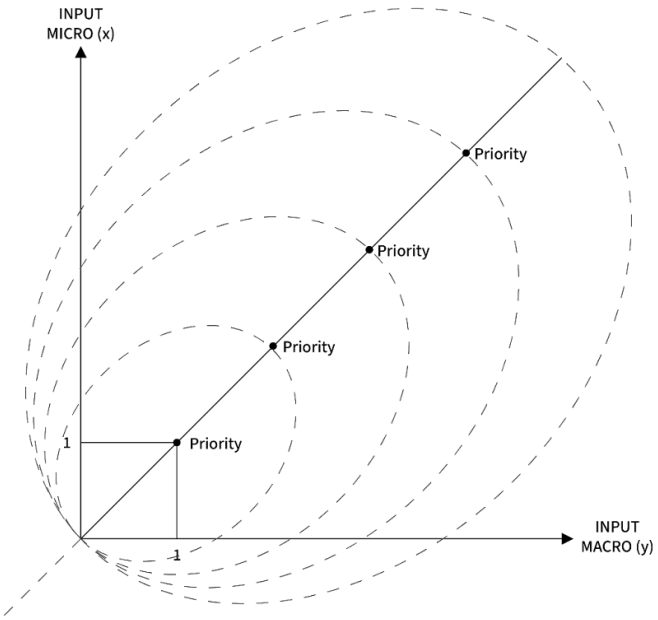

Figure 6. [Resource: Authors.]

3) Harvesting data from communities engagement practices (e.g. from focus groups, Open Space Technology workshops, stakeholders engagement initiatives, Town Meetings, etc.) to sort the information into the matrix model;

4) At the meso level, prioritize agenda items and decode the most relevant policies that emerged from the correlation between the micro-level and meso-level. This phase is crucial to bridge the coordination gap identified in the policy definition process;

5) The meso level can deploy policies with the aim of making them more place-based and targeted.

Within this process, the service designer for the public sector, emerges as a new figure who can facilitate the transition between the macro and meso levels, organizing the priorities expressed at the micro level and enhancing the efficiency of PAs in policy

determination.

6. Research Methodology

To pursue the proposed objective, this research will follow the following research method:

Phase 1: Investigation of Framework Integration in Policy Formulation (3 months)

Five to ten semi-structured interviews, each lasting approximately 20 minutes, will be conducted with policymakers in the public sector administration. The aim is to gather data on trends that either hinder or facilitate the operational implementation of projects, in order to understand how the model matrix can be validated within policy formulation and public service delivery. Thanks to the visiting opportunity at Aalborg University in Denmark, interviews will be conducted in Denmark with the aim of formulating a generic macro-flow of how a civic initiative operates, as well as to learn about new systemic structures and best practices.

Phase 2: Testing and Evaluating Framework Effectiveness (3 months)

In collaboration with a sample of two PAs located in internal areas (meso level) within the municipality of Florence, this phase will establish clear metrics for evaluating the framework and test its impact on public policy in the field. The methodological approach will be defined following the interviews.

Phase 3: Matrix model Development and Dissemination (1 year)

This phase will systematize the results obtained in Phase 2 and finalize the integration of the matrix model into the definition of policies and the design of public services. Multidisciplinary collaborations are envisaged wherever specific expertise is lacking.

7. Conclusions

This research has highlighted the profound challenges faced by Italy's internal areas, which are experiencing a progressive weakening of essential services and an unequal distribution of economic opportunities. Through an in-depth analysis of public policies and governance dynamics, it has become evident that current strategies exhibit significant deficiencies in policy coordination, particularly in harnessing the potential of active engagement with civic activism entities. While the SNAI represented a significant step towards rebalancing territorial development, its effectiveness has been hindered by constraints that reveal administrative fragilities. In this context, the role of the service designer within the public sector emerges as a key professional figure capable of navigating the inherent complexities of public policies. This research emphasizes how systemic approaches and existing multi-level models can foster greater integration between local needs and European policy frameworks. By analyzing the three levels of engagement—micro (civic activism), meso (intermediary bodies), and macro (European actors)—the study outlines a comprehensive framework that underscores the urgency of a paradigm shift in public policy design. This shift is encapsulated in the concept of coordination, interpreted as an alliance that combines top-down resource allocation with bottom-up resource mobilization, aiming to enhance the effectiveness of public policies

in delivering projects—and consequently, services—across territories.
The research process is currently defining a methodology aimed at validating and developing the proposed framework, with the intent of contributing to policy alignment. The anticipated findings and implications of this study offer a resource for other European countries facing similar challenges, while for the Italian system, it seeks to identify operational and cultural fracture points, guiding policies towards resolution. More broadly, the insights gathered in this paper aim to underscore the importance of integrating innovative design practices within PAs, with the goal of charting, through the discipline of SDPS, more responsive and equitably distributed public policies.

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"SHAPING DEMOCRATIC GOVERNANCE THROUGH INFORMAL DESIGN EDUCATION"

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ABSTRACT | This paper explores how bottom-up, non-formal design education formats can contribute to improving governance and policy design, with a focus on municipal-level practices in Budapest, Hungary. The authors investigate how participatory design methods can be integrated into the training of municipal employees and civil activists to strengthen democratic values and governance processes (Mintrom et al, 2024). By examining an experimental education format consisting of after-hours training sessions organised with Közélet Iskolája (School of Public Life), the paper demonstrates how these design research methods (persona building, user journeys, stakeholder and problem mapping, action plan visualisation, community brainstorming, etc.) can promote collaboration between local governments and civil society. The training sessions target diverse groups of activists and municipal workers, focusing on the implementation of participatory design methods in everyday governance tasks. The study analyses how this bottom-up approach encourages active citizen participation, fosters inclusive decision-making, and enhances public service delivery, especially in more conservative or authoritative political climates (Málovics et al, 2024). The research suggests that participatory design education, especially when conducted informally and through personal motivation, can reshape municipal governance by encouraging collaboration in policy design, leading to more democratic and responsive governance systems.

KEYWORDS | PARTICIPATORY DESIGN RESEARCH; CO-CREATION; POLICY DESIGN; CIVIL ACTIVATION

1. Introduction

Even though several municipalities and inter-sectoral collaborations across Europe are using participatory design methods in civil engagement and decision-making, this approach is still far from still far from being well integrated in public administrations across Europe. While Barcelona involves citizens in urban planning (Ajuntament de Barcelona 2023), Bologna allows citizens and organisations to co-manage public spaces (Buemi 2021), and Berlin (Herzberg 2013) as well as Lisbon (Allegretti & Antunes 2014) applies participatory budgeting, cities like Budapest still lag behind despite the growing adoption of these inclusive methods in Western Europe. While some efforts have been made, large-scale participatory planning and direct citizen involvement in urban governance remain limited, leaving potential for future development in fostering civic engagement.

This study examines how bottom-up, non-formal design education formats can contribute to improving governance, policy design, and participatory urban planning with a particular focus on municipal-level practices. Specifically, it explores training civil sector workers and activists through the application of design tools. These stakeholder groups actively seek fresh perspectives on collaboration and participatory practices, and they both tend to be involved in equitable urban planning practices, although from contrasting sides. Often, civil sector workers engage in activism as volunteers connected to topics such as housing issues, gender equality or legal advovacy of vulnerable groups, and their time is invested in meanginful change- therefore some participants embody both experiences. The study is set against the backdrop of a public life in Hungary characterized by high societal tension, an overburdened and underfunded civil sector and a shrinking space for democratic and community-led decisionmaking. The authors are social designers and researchers with academic affiliations who also work independently as trainers, facilitators, and practitioners in social design. This study presents and analyzes a recent series of training workshops conducted with the School of Public Life (Közélet Iskolája, KIA).

KIA is a grassroots civic education center founded in 2014, dedicated to building a democratic and just Hungary. Based in Budapest, the organisation is and has a nationwide reach through their activities and trainings. The organization engages a wide variety of stakeholder groups, with a special focus on marginalized communities and those working on their behalf to organize, advocate for their rights, and protect their interests effectively. The organisation aims to provide accessible knowledge and skills for grassroot organizations and individuals, particularly in anti-oppression work. Additionally, it supports movements and civil society organizations striving for social justice, helping them operate

more effectively while fostering a diverse community where critical thinking, democratic participation, and solidarity are highly valued (https://kozeletiskolaja.hu/homepage/).

KIA's work is heavily influenced by participatory action research, which serves as the primary connection to its collaboration with the authors, who apply these methods through creative processes in their academic work. The specific focus of the conducted workshops were, therefore, to provide a variety of creative and design tools to the training participants (activists from NGOs and civil servants), which they can use through their professional and activist work. According to the authors' past experience on the field, creative tools can be highly effective in fostering community engagement and ownership (Málovics et al., 2024), especially when working with vulnerable or multi-stakeholder groups from diverse social backgrounds. Recognizing the need to incorporate training on engagement through design into KIA's portfolio, the collaboration sought to develop a framework that aligns with KIA's existing participatory research practices. This framework builds upon those practices through creative methodologies, offering practical knowledge to non-designers.

Both KIA's work and certain aspects of the authors' academic work can be understood as counter-hegemonic (Málovics et al, 2024). To fully grasp the ecosystem in which the training described below was developed, two contextual factors must be considered. First, the illiberal transformation of the Hungarian state has fostered a hostile environment for civil society organizations (CSOs), characterized by severe funding cuts for non-loyal groups, stigmatization as "foreign agents," and state interference to hinder their operations (Grzebalska and Pető, 2018). Second, since 2010, the government's "politics of revenge" has targeted vulnerable groups as perceived enemies of the nation—such as refugees, LGBTQ communities, and the Roma—creating widespread stigmatization and discrimination against potential stakeholders in, leading to a constricted access to funding and visibility (Udvarhelyi, 2014).

2. Context

2.1. The background- A troubled ecosystem of civil engagement

In an environment where so many contrasting forces are at play, good practices of civil engagement and encouraging activism on a policy-maker level are rare and highly valuable. Depending on the political agenda of individual Budapest municipalities, there are currently a wide variety of principles at work that either encourage or largely negate such initiatives, especially when it comes to citizen involvement in urban and policy design. The 8th district, Józsefváros, stands out as a positive example, particularly given its diverse social fabric, the wide variety of nationalities among its residents, and the high concentration of social challenges and organizations working to address them, such as homelessness, domestic violence, and racism. Since 2019, the district has maintained consistent leadership and implemented a range of socially innovative governance practices, including participatory budget planning, organizing civil forums, co-designing public spaces, and actively working toward a more sustainable housing policy—despite the increasing gentrification of the area. Most training programs organized by KIA, including the

one presented in this study, took place in this district, providing a rich context for both theoretical and practical aspects of the training.

2.2. NGOs and civil actors in urban design

Even though the discourse is still in its early stages, urbanism is one of the most developed fields for fostering fruitful cooperation between Hungarian municipalities, professionals, NGOs, and local communities. When it comes to local involvement and participation, the municipality of Budapest's 8th district (Józsefváros) is the most active. In 1997, it initiated the organization Rév8 to implement urban development projects, focusing on making the city more livable and appealing through local participation. Rév8 has worked on more than 20 urban projects, including design development, completed implementations, and reconstructions. Another successful collaboration between top-down and bottom-up initiatives is the Bartók Quarter in Budapest's 11th district. The Bartók Quarter serves as a living example of the 15-minute city concept, where essential services and institutions, restaurants and cafés, galleries and art studios, civic initiatives, and educational programs are all located within close proximity, transforming the neighborhood into a true meeting point for locals.

Alongside successful examples, there are also less effective projects. One early case from 2013 was among the first large-scale participatory landscape interventions in Budapest. During the redesign of Teleki Square in the 8th district, designers sought to bring together four different stakeholder groups—the local council, architects, a local association, and "critical intellectuals" (a term used by the author)—to find common ground. The project was widely regarded as a success by architectural professionals, the media, and the local council. However, as Balázs (2020) highlights, the fact that the marginalised population of the district (who are otherwise a high proportion of the inhabitants) was not represented in the design process. The result materialises the contrasting needs and objectives of the different stakeholders: the square today is a guarded green oasis, surrounded by a massive fence, lies in one of Budapest's most stigmatised areas, marked by crime, poverty, and discrimination (Czirfusz et al., 2015). The contrast is striking: inside, there are neat lawns, flowerbeds, park furniture, and families enjoying leisure, while outside, the scene shifts to dirty asphalt, migrants near a Lagos buffet, Roma youths on benches, and homeless people under sparse trees (Balázs, 2020).

We can see therefore, that even cooperations has been started between the municipalities and civil sector with the tools of design, plenty of place for improvement remain. The phenomenon can be understood from another perspective as well: if we consider the wider context, the design process can be understood as a systemic challenge instead of a solely design problem. It is apparent that the shortcomings of the design process of the Teleki square originate from a lack of communication between local stakeholders rather than the insufficient participation of local inhabitants. As described earlier, the complexity of social challenges, class struggle, homelessness, and substance abuse that characterized the area before the redesign process did not actually get addressed, and these practices were relocated instead of being eliminated. The usability, safety and aesthetic quality of the area

increased significantly without addressing some of the systemic issues, mirroring the gentrification process of the district. We can conclude by stressing the limitations of design in solving such complex challenges, and instead highlighting how design can be a powerful tool to understanding and addressing the complexity itself. The training program described below was specifically created to fulfil this need detected by KIA and their clients, who articulated a lack of practical knowledge in including effective participative inquiry tools in their daily work and civil activism.

3. Training method and analysis

The training method was built on a critical application of participatory action research methods (Juarez-Brown, 2008; Fine-Torre, 2021) and an intersectional approach rooted in gender equality, but also fit for understanding a variety of complex social contexts (Crenshaw, 1989; Erete et al, 2018). The theoretical frameworks were laid out in the preparatory phase in collaboration with KIA, where the organization placed an emphasis for the training material's translatability to practical application. The training structure was required to fit to KIA's already available participatory research and participatory action research trainings, integrating a creative angle in order to seamlessly approach target groups less used to the terminology of advocacy and activism. Therefore, the authors developed and conducted two pilot training sessions in 2024, one in early March, the second one in October. These sessions aimed to bring together municipal representatives, professionals, and civil activists through participatory design tools while exploring the potential of design research training for various professional fields. A total of 25 participants attended both sessions, representing a diverse range of professions and interests, including municipal representatives, creative industry professionals, and NGO leaders and activists advocating for various causes such as gender equality, child rights, disability rights, and environmentalism. The training was not meant to provide an all-encompassing framework for a variety of applications by participants, rather, it aimed at providing an introduction and an overview to those looking to explore new options for challenging conditions and widening their toolkit as practitioners.

3.1 Training structure

While both sessions followed a similar structure, the authors made modifications to the second session based on insights gained from the first. To create an engaging and collaborative experience, each session began not only with an introduction to the overall aims and structure but also with mutual introductions between the facilitators (the authors of this paper) and the participants. To give opportunity for the participants to explore key concepts, the introduction was followed by a short presentation about the fundamentals of social design (Tromp & Vial, 2022; Papanek, 1973), different levels of participation and empowerment (Cavalieri & Almeida 2020; Arnstein, 1969) as well as the design tools of participation (mapping, visual storytelling, community brainstorming, co creation, shared persona building etc.) illustrated through the timeline of the Double Diamond diagram (Design Council, 2006) as well as presenting widely used design thinking methods applicable in participatory research (persona building, user journeys, stakeholder and problem mapping, action plan visualisation, community brainstorming, etc.). The presentations also highlighted the importance and opportunities offered by intersectional

approaches in building impactful social change. Both in academic and in community-led research, actors and policymakers have increasingly involved diverse stakeholders—such as service users, citizens, and marginalized communities—in shared decision-making to ensure research is relevant and translational (Vaughn et al., 2018). Today, stakeholder engagement ideally exists on a continuum, from academic-driven research to equitable partnerships between academics, policymakers and communities, and the training developed by the authors aimed at bridging existing gaps in currently available support for activists.

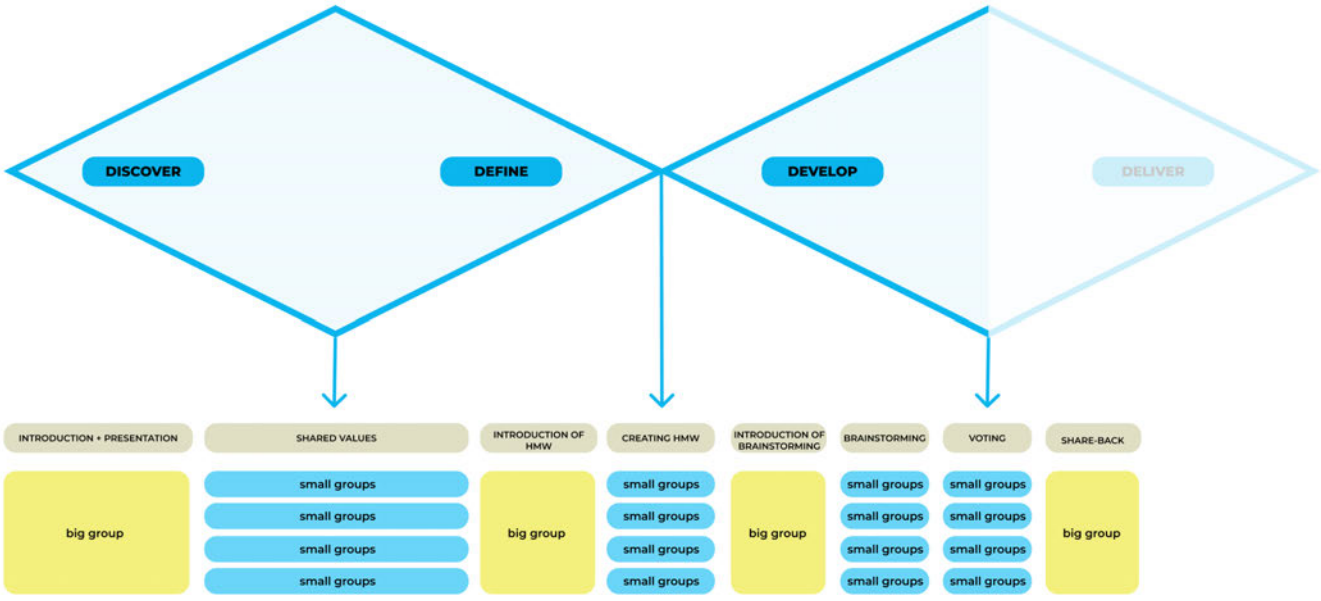

Figure 1. Training structure model in parallel to the Double Diamond diagram. Source: Authors.

Afterwards the participants were divided into smaller, professionally diverse groups of 4-6 people and until the end of the session they worked together as teams. The participant groups's first task was to share their primary interests within their group and reflect on the intersections of their personal backgrounds and areas of expertise. This exercise helped identify shared values and unique perspectives, strengthening team cohesion. Each group then presented its shared values, after which the facilitators introduced the structure and purpose of "How Might We..." (HMW) questions. Participants were encouraged to transform their identified intersections into an HMW question, guiding the next phase of the session. This was followed by a brainstorming session: after introducing the main principles of community brainstorming (Brown, 2009), participants assessed ideas to answer their own HMWs and in the second round they had to rank the ideas based on criteria such as ease of implementation, potential impact, and personal relevance, narrowing down their focus to actionable concepts. Finally, participants created a shared map of their competences and resources, pooling their skills, knowledge, and available resources. This step emphasised the power of collaboration and demonstrated how collective strengths can drive progress. Due to time limitations and group dynamics, the session did not fully adhere to its planned schedule. In the final step, participants were meant to materialize their concepts into a visual action plan, experimenting with visual communication tools and mapping out

resources to bring their ideas to life. However, this component could not be fully executed within the given timeframe.

The second session was conducted six months after the first and applied a few modifications according to the lessons of the first one. One important change was shortening the social design presentation: by introducing the above-mentioned topics in a more dense way, participants had more time to explore both the theoretical background and the practical applications of social design, design thinking and design research methods. Another major adjustment was the introduction of a more concrete and engaging task, in order to emphasize more clearly the direct impact of their inputs. Here, groupwork centered around various visualization-based tools which helped clarify and pinpoint group dynamics as well as individual positioning. These exercises were inspired by participatory research methods rooted in creative expression (Reinharz-Davidman, 1992) During the exercises, firstly, participants were first asked to individually connect their core values and skills to an animal or plant. Then, within their small groups, they collaboratively created a "magical creature" that embodied the collective attributes of their team members. Each team then introduced its magical creature to the larger group before brainstorming solutions for their HMW challenge, tailoring their ideas to the unique characteristics of their shared creature. This

3.2 Feedback

Data was collected using both non-formal (such as immediate oral feedback through closing shareback sessions) and traditional methods (such as interviews, anonymous surveys conducted by KIA). Immediately after each session, group conversations were conducted with all participants as part of the closing circle. Additionally, several months later, follow-up interviews were recorded with three former participants.

In the closing circle of the workshop, each participant had the chance to share some personal insights about their experiences and leave suggestions for the future. Based on this feedback we can conclude that the participants in general felt safe and supported during the process. Besides the general experience of a positive and supportive environment, some of them also highlighted the unexpected results of the 2 hours long sessions as it led a very diverse group of stakeholders to find common ground based on their interests and goals through the proposed design methods.

Participants of the second session also expressed their satisfactions about how easy it was to connect with each other and find shared values through the introduced design methods. More interviewees articulated the importance of the association game with the involvement of a magical creature: "By associating with animals, the whole process became very easy to understand. Maybe because it brought us back to our childhood, when we all loved animals. It was a really good experience to see that by this we could bridge the distances between us." Referring to animals and magical creatures during the second session led to several positive outcomes, particularly in terms of visual communication. Since many participants were not from creative fields, tasks involving visualization could have been challenging or even demotivating. However, as one participant shared: "Thinking about

magical creatures really helped with the graphic visualization. Also, through visualization, we were able to communicate more easily than with words—it helped us get to know each other and identify our shared values. I was surprised by how easy it was to do this in such a short time."

4. Results

Based on the experiences from the two training sessions, the authors identified several key results and insights through on-site observations and follow-up interviews with participants.

According to the on-site observations of authors and immediate feedback of participants, several opportunities as well as challenges were identified. In some cases these opportunities and challenges were connected and resulted from one another. The training sessions demonstrated that creative, participatory methods—such as visual metaphors and collaborative exercises—significantly enhance engagement, especially among participants coming from different fields. A key learning was to understand the challenges of time limitation: non-designer participants needed significantly more time to understand the general concept of design research as well as framing the HMW questions. To these challenges the authors responded with alternating between small and large group settings. By creating small groups, participants could support each other easier and during the share-backs of big groups they could hear more cases and discussion. In the case of HMW questions the *magical creature* served a significant support for the second group to emphatise with each other and their missions. The *magical creature* exercise helped simplify complex ideas, foster connection, and build shared understanding among diverse professionals. Another key learning was the importance of adapting content: shortening theoretical presentations in the second session created more room for practical exploration and group interaction. However, time constraints remained a challenge, particularly when attempting to implement more complex outputs like visual action plans. Additionally, managing group dynamics within limited time required flexible facilitation strategies to ensure equal participation and progress.

After the training sessions, participants also expressed the facilitated design process helped them understand and emphatise with different missions of their groupmates, even if they came from very different fields and contexts. This observation suggests that through a well-structured and longer training methodology, municipality workers could gain tools to map and understand actual cases more effectively. Reflections also suggested that practicing non-formal decision making has the potential to bring people from very different backgrounds to a common understanding, showing promising potential in case of further training method development. Furthermore, as an indirect result of these training sessions, several other, specialized short courses were developed in KIA's portfolio, reflecting on smaller aspects of the larger learning process described above.

Months after the sessions, three participants participated in interview sessions to help us understand their point of view about how design methods can be useful for their work. They articulated several aspects through their experiences. One interviewee used the entire

workshop method at an intercultural training she facilitated and others also stated that they would include the learnings in their training. Although all of them articulated that the real systemic development would be to use design methods not only for training but to design new project proposals (by involving their target group into the development phase) or to map organisational challenges in general. For these purposes they believe that each member of one organisation should experience a longer training about design methods in order to arrive at the same ground and after that even their yearly strategic meeting could be structured by design thinking: "It should become part of our working culture so we could face together any kind of challenges with this method." One of the interviewees also mentioned that these design methods could help their target group (youth living in state care) with self-representation, self-expression as well as developing problem-solving skills. By involving their groups into these kinds of design challenges, she believes that underprivileged youth could be integrated even into policy discussions.

5. Conclusion

As the authors have experienced throughout their practices, participatory design trainings, workshops or hackathons bear the capacity to equip multiple stakeholder groups (such as civil actors, policymakers, activists, etc.) with collaborative tools that foster mutual understanding, enabling stakeholders to engage in more inclusive decision-making (Simonsen & Robertson, 2012). By involving diverse perspectives in the design process, these trainings help bridge gaps between different groups, ensuring policies and initiatives reflect the needs of the communities they serve (Bjögvinsson, Ehn, & Hillgren, 2012). This approach strengthens democratic practices by promoting transparency, shared ownership, and long-term engagement in civic and policy-related work (Sanders & Stappers, 2008). Developing a clearer mutual understanding among such a wide range of stakeholders can prove beneficial to intersectoral collaborations through facilitating shared goal setting, as well as increasing the visibility on design's capacity to foster collaboration.

A similar understanding was gained from the training sessions described and analysed above, with the addendum of further aggravating circumstances characterised by centralised and top-down decision-making practices of current policymaking in Hungary. As designers, however, the real challenge is to find the right tools to address the given circumstances, therefore such a case inspires customizable approaches. As design scholars and social design practitioners, building and conducting such a training deepened the authors' understanding on how various (non-designer) groups can integrate these tools into their daily practice. Among the multiple ways of applying such new knowledge, three most important stand out: firstly, using counter-hegemonic (or non-hegemonic) decision-making approaches in diverse groups of activists and municipal employees enhances more democratic policymaking practices; secondly, both groups experiencing opposing perspectives helps empathize with other groups' understandings and goal-setting or even internalize other groups' values and goals quicker; and thirdly, using visualization tools to set a shared baseline proves very effective for diverse stakeholder groups to build a common understanding and language and quickly establish shared values.

Moreover, a small minority of participants did arrive from a design background either working outside the design field or as activists still working on their design degree, and their reflection shed light on how design education can incorporate the specificities of such ambiguous scenarios.

In conclusion, while participatory design tools offer valuable benefits for various stakeholder groups, their effectiveness is often constrained by environmental factors, limited time resources, and reluctance from management to fully integrate them into decision-making processes. Despite these challenges, findings described above suggest that such tools provide significant personal benefits by helping participants make sense of complex processes and reducing the risk of burnout- which is especially frequent in the under-resourced civil sector and activist scene- rather than immediately leading to systemic change. However, interviews conducted with participants highlight that fostering critical thinking and embracing more radical collaboration can contribute to bottom-up transformations, supporting more democratic and community-led approaches in topics such as urban development, policy design and citizen engagement.

Furthermore, the recurring concern of time constraints suggests a need for extended training programs lasting 7–10 days, allowing for a slower and more practical learning process, including tangible examples and case studies with different outcomes. Future research is needed to explore the design and implementation of such programs to maximize their long-term impact on democratic practices and stakeholder collaboration.

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CARE AND PUBLIC INNOVATIVE ACTION ISSUES

Managing new ethics of public design

Social Design for Everyone: A Visual Toolkit for Social Design Education

AUTHORS

Jonathan Ventura
Michal Pauzner
Andreas Unteidig
Matteo Moretti

JUNE 3-7, 2025

Hello

Jonathan Ventura

Shenkar.
Engineering.
Design. Art.

Michal Pauzner

Shenkar.
Engineering.
Design. Art.

Andreas Unteidig

Lucerne University
of Applied
Sciences and Arts

Matteo Moretti

University of
Sassari

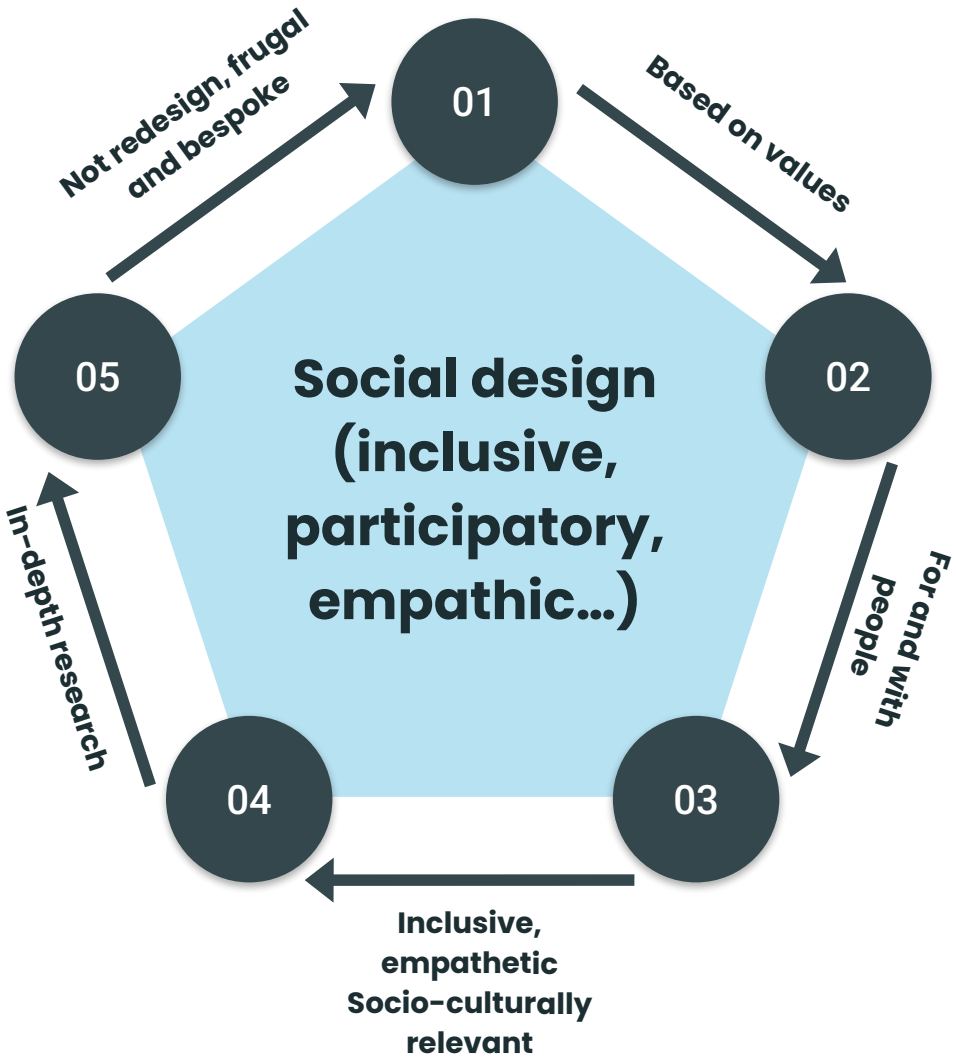
social design network

Since 2020 → 55 members →
28 countries

Session schedule

5 min	Introduction and Background
5 min	Presentation of Toolkit Concept
20 min	Activity & Discussion

Social design



Ventura and Bichard, 2017

Crisis as a constant

Crisis must be treated no longer as a diagnosis applied by an external observer but as ‘an act of communication with critical intentions,’ whos validity claims reside in the end in the discursive activity of the participants themselves.

Cordero 2014, 502

Values

Pluralistic, humanistic

Value Based

Multidisciplinary

Long-Term

Community based

Research Based

Socio-Cultural Context

Multi-Stakeholders

Main challenges (BA level)

Individual Level

Lack of prior exposure to social contexts

Missing personal skills:

- Discomfort with Collaboration
- Uncertainty and Ambiguity Tolerance
- Ethical Sensitivity and Advocacy Balance
- Communication and Facilitation Skills

Motivation and Personal Relevance

Main challenges (BA level)

Program Level

Overemphasis on individual performance

Traditional categorisations of design disciplines

Limited project duration and scope

Insufficient support for real-world engagement and working with outer collaborators

Faculty expertise gaps

Who are we aiming for?

Novices in social design

BA level educators

BA level programs

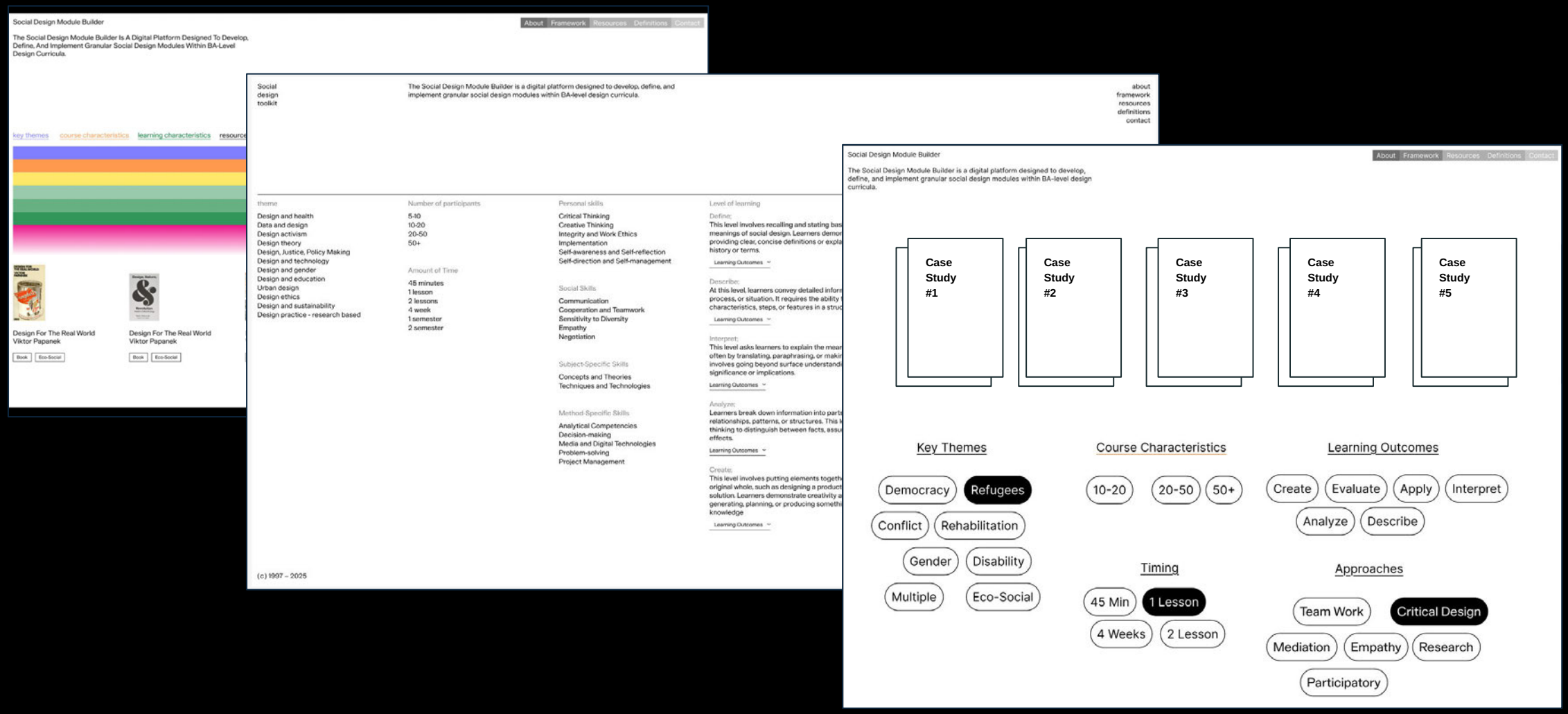
Interested in implementing social design into their courses and existing curricula

Pedagogies of Social Design

- ➔ What does the pedagogy of social design look like in practice?
- ➔ What methodologies emerge when educators engage with social design concepts?
- ➔ Where is social design taught?
- ➔ How does social design education vary across geographic and cultural contexts, and what are its key characteristics?
- ➔ How can these methodologies be adapted across different disciplines and temporalities within BA-level curricula?

Social Design Education Modules

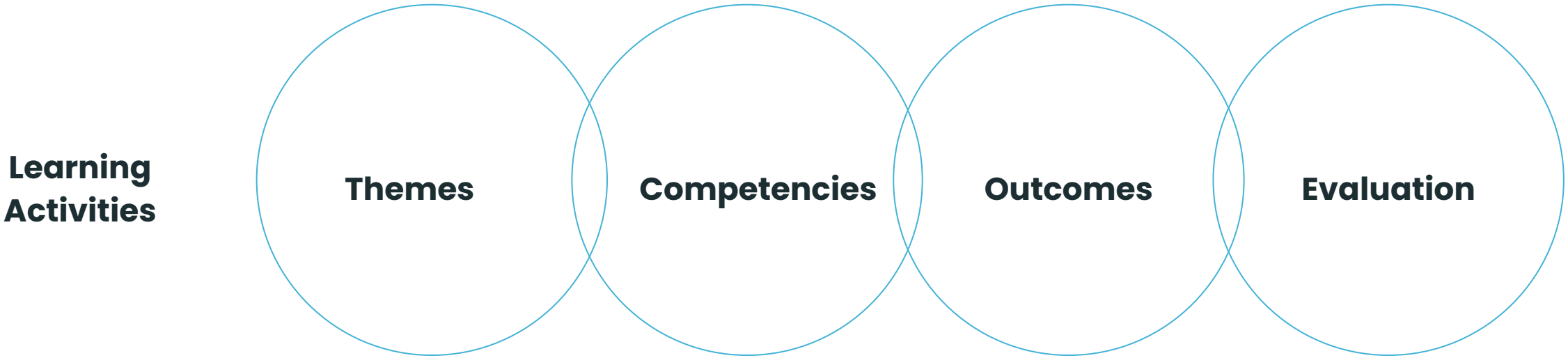
A new toolkit to integrate social design values in design curricula



Current iterations of the module builder, 2025

Possible outcomes

Activity and Discussion



Next Steps

- ➔ Collect and map case studies
- ➔ Further iteration of the module builder
- ➔ Opportunity to engage as a working group
- ➔ Pilot in Shenkar (October 2025)
- ➔ Possible comparative research
- ➔ future conferences and publications

Thank You!

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STOCKPORT CREATIVE CAMPUS: EXTRACTIVE PEDAGOGIES?

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ABSTRACT | This paper presents an analysis of 'live' student projects delivered by Manchester Metropolitan University (MMU) as part of *Stockport Creative Campus* (SCC), a project which links university activity with a public authority, partner organizations, and the citizens of Stockport, Greater Manchester (UK). Recent decades have seen a growth in the adoption of project-based learning within design education. Current literature focuses on the benefits of such approaches for students' learning and their future role as professional designers in society, however, there is a lack of critical discussion regarding the value these approaches have beyond the learning experience. As argued by DiSalvo, the pursuit of innovation and uncritical application of design methods to address societal issues risks reproducing and re-asserting structures of power over communities that we work with. Through an analysis of four student projects taking place across the departments of Design and Architecture at MMU, this paper questions the value of 'live' student projects for the communities they align with. We outline four pedagogic models and assess their contribution to the wider aims of *Stockport Creative Campus* and the potential risks they pose in perpetuating extractive practices.

KEYWORDS | SOCIAL DESIGN, PROJECT-BASED LEARNING, DESIGN, ARCHITECTURE, COMMUNITIES, EXTRACTIVE PEDAGOGIES

1. Introduction to Stockport Creative Campus

Project-based learning and the use of 'live' briefs has been widely adopted in design education and are "at times presented as best practices in design education" (Noel, 2021: 256). DiSalvo (2021) warns that in the pursuit of innovation and uncritical application of design methods to address societal issues we risk reproducing and re-asserting structures of power over communities that we work with. This paper proposes a critical discussion of project-based learning as a pedagogic model widely used in design education and questions its potential for extractive practices through an analysis of four student project models. In environmental terms extractivism refers to the fast removal of "large quantities of natural resources" (Acosta, 2013:62). While environmental forms of extraction remain an important global focus, in recent years "extractivist practices have been abstracted and applied to entirely new areas" (Chagnon et al., 2022:761). We will use the term pedagogical extractivism to refer to the practice of removing cultural/social resources for distant (institutional) benefit, relating to a context/community in a way that is short-term and non-reciprocal.

Design Factory Manchester is an innovation hub at Manchester Metropolitan University (MMU) that acts as a vehicle for researchers, and students to drive sustainable development in communities within and beyond the city. Stockport Creative Campus (SCC) is one of the first projects undertaken by the Design Factory Manchester initiative. As one of ten Metropolitan Boroughs in Greater Manchester, Stockport is located eight miles south-east of the city of Manchester, in the Northwest of England. Led by Stockport Metropolitan Borough Council (SMBC) SCC is a three-year town center reinvigoration program transforming Stockport's heritage rich center. The case studies presented here set out four models of student projects that have been delivered across Manchester School of Art's (MSoA) department of Design and Manchester School of Architecture (MSA) at MMU during the academic year 2023/24. Each of these projects involved student briefs linked to the town of Stockport either via the specification of a single or multiple sites; developed thematically with an external organization; or initiated by a community partner. The paper has been jointly written with lecturers who led each of the projects in collaboration with Potter and Micklethwaite from the Design Factory Manchester team. The primary goal of project-based learning in design education is clearly related to student experience, and all the case studies discussed here center around providing students with an opportunity to develop skills that are vital to designers working in contemporary contexts. This paper, however, does not seek to discuss the merits of these projects within this remit. Instead, we present them as case studies for critical reflection on the impact they have (or could have) upon the people who live and work in the communities in which they are located and question the potential (or risk) for extractivism.

2. Site-responsive Model

The site-responsive model represents a common approach in design education, in which students are given a 'live' location to respond to. Locations may be a vacant site or an existing building in 'need' of regeneration and are selected by course tutors for the opportunities they present for transformation.

During Year 2 of the BA(Hons) Architecture course at MSA students work on a series of interrelated projects that develop the context for architecture as a social and cultural act commencing with a 'Transforming Places' module. For 2023/24, a vacant and somewhat overgrown plot on Lower Hillgate in the center of Stockport was selected as the local site for students to respond to. They were tasked with researching and designing a small number of dwellings with associated creative workspaces for the site that drew upon the town's past and current entrepreneurial nature. Stockport was chosen as a study territory due to its industrial heritage and the opportunities presented for innovative projects through aspects of post-industrial decay and urban fabric 'gaps'. With Manchester's development reaching saturation, Stockport's strong connectivity, diverse demographics, and cultural resurgence - marked by its designation as a Greater Manchester Town of Culture for 2024 - made it an ideal site for exploring creative and sustainable architectural solutions for BA2 architecture students.

Prior to the 2023/24 launch, BA2 program co-leads met with representatives of Stockport Metropolitan Borough Council recognizing the course's project alignment with the broader SCC aims. Aside from this overlap, the project did not have any formal external partners, and the student project was linked with Stockport via the selected site alone. 186 students were introduced to the site location as part of their Studio 2.1 project briefing, visiting Stockport and the site in Lower Hillgate. Students worked in 10 Studio groups with two studio tutors and were encouraged to visit the site under different conditions with many engaging in conversations with local business owners and members of the public. An interim review for the project took place on campus.

Figures. 1 (left) and 2 (right). Pop-up exhibition of selected BA(Hons) Architecture student project outcomes at Miru Mill, a creative co-working space in Stockport.

Following the end of the project a pop-up exhibition of a selection of the students' work was organized at a co-working space near to the Lower Hillgate site in Stockport (see Figures 1 and 2). SCC stakeholders were invited as well as being open to the public, but, unfortunately, the event received little attendance except from some younger members of the surrounding community. This is perhaps indicative of the lack of formal external partners to the project. Students also took part in the annual Faculty Degree Show where they exhibited their BA2.1 project outcomes.

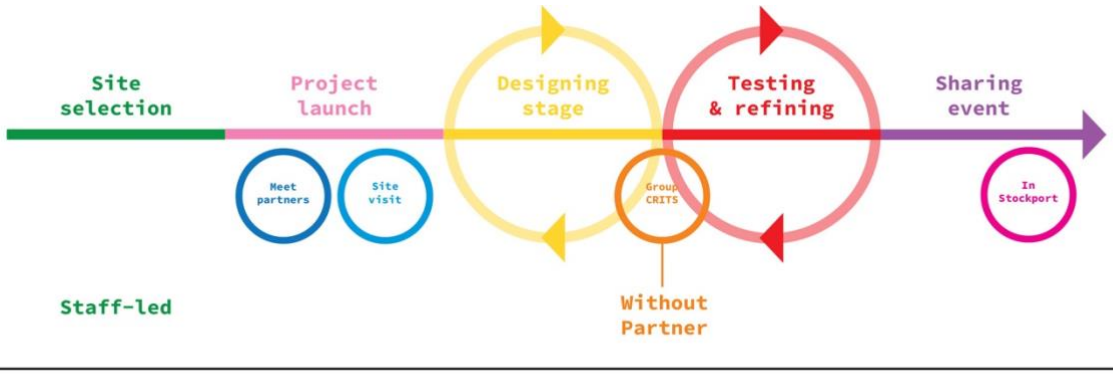

Figure 3. The Site-responsive model (as demonstrated BA2 Architecture project 'Slicing and Stitching Stockport') includes staff-led site selection, on campus project launch followed by group site visits, mid-point CRITS without no external partner and a final showcase of student work in Stockport.

The diagram above (Figure 3) shows the different stages of the site-responsive model demonstrated here by the BA2 Architecture 'Slicing and Stitching Stockport'. This (and related diagrams used for each model in this paper) has been adapted from diagrams developed by Daniel Charny and Maya Alvarado to illustrate 'Fixperts' student projects in *Fixperts*: *models, learning, and social contexts'* (Micklethwaite et al., 2020).

Key aspects of the site-responsive model include:

- Site selected by teaching staff due to relevance of local context and transformative possibilities offered for students to respond to.
- Project aligned with SCC aims but no formal external partner.
- Project launch on campus with site visit following.
- Mid-point CRITS held on campus with no external partner present.
- Project outcomes shared via pop-up exhibition in Stockport and included in the Faculty end of year Degree Show with SCC stakeholders invited.

3. Multi-site model

The multi-site model is an extension of the site-responsive model, with students given a selection of sites to choose from. External partner organizations may be involved but the site selection and project brief remain staff-led.

MA Interiors at Manchester School of Art is a one-year full-time (or two-year part-time) course in which students investigate and interpret interior space, inside and outside of the traditional architectural envelope. For 2023/24, 30 MA Interiors students undertook a Stockport-linked project as part of their final 'Synthesis' module. This module puts into practice methods and approaches for devising interior schemes in relation to site specific contexts in real-world settings. A briefing for the project was hosted in Stockport's St

Mary's Parish Church, providing a historic setting next to the town's market hall. Three sites were pre-selected for the students to focus their responses on: 18-19 Market Place, a mock-tudor building included in forthcoming regeneration plans as part of SCC's wider funding; The White Lion public house (including affordable residential spaces) recently refurbished through the SMBC's wider regeneration plans; and Albion House an empty plot set for re-development into flexible commercial and residential spaces by property developer Hall & Co. Students' were given a tour of each site by SMBC's Development and Regeneration Manager and Architect Construction Lead.

Figure 4. MA Interiors students and staff entering 18-19 Market Place during site visit and tour of Stockport town center following a project briefing.

An Interim Crit was held at MMU with students presenting their work-in-progress to the MA Interiors teaching team. Following completion of the module, four project proposals were identified as aligning with the wider aims of SCC and these students were invited to present to the SMBC team along with the Director of Hall & Co.

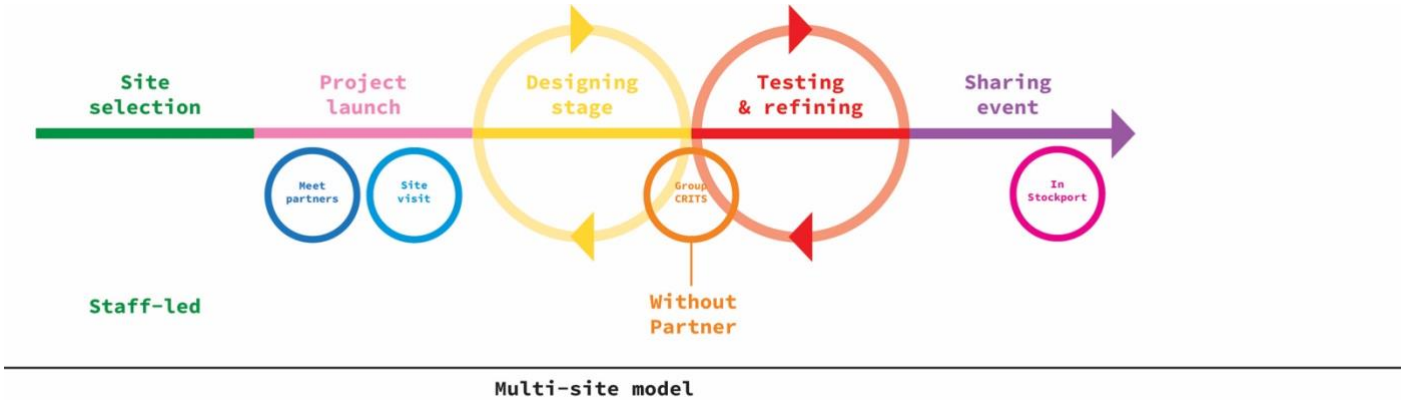

Fig.5: The Multi-site model (as demonstrated by the MA Interiors 'Synthesis' unit) includes MMU staff-led site selection, on campus project launch followed by group site visit led by external partner SMBC, mid-point CRITS without an external partner and a final presentation of student work to partners in Stockport.

Key aspects of the multi-site model include:

- Sites selected by teaching staff in relation to external partner relationships.
- Project aligned with SCC aims.
- Project launch took place on campus with site visit following led by external partner.
- Mid-point CRITS held on campus with no external partner present.
- Selected student project outcomes shared with external SCC partners via in-person oral presentations.

4. Partner model

In the partner model tutors develop relationships with external partners and co-develop a project brief before engaging students. The brief is linked to a particular locale but without a fixed site to respond to. This gives students' free choice over their creative responses allowing mixed disciplines of students to respond to a collective theme.

'Unit X' is a Design wide initiative that invites students from across the department to develop creative projects in association with partner organizations from Greater Manchester and beyond. For 2023/24 one (of seven) Unit X projects were linked with Stockport, developed in collaboration with external partners Zoetmulder - a design agency for architecture, interior, urbanism, and design, based in Delft, the Netherlands - and Future Everything – a Manchester-based digital arts organization and one of the partners of SCC. The project brief, titled 'Reframing Experience', tasked a mixed group of 61 2nd year students from six undergraduate disciplines in the department of Design to undertake a placemaking exercise centred on culturally activating Stockport town centre. Students worked in twelve mixed-discipline groups to develop proposals for permanent or temporary interventions for Stockport town centre. External partners were selected by the teaching team based on the potential they posed for students in relation to the sharing of professional methods and approaches. The project was launched with external partners present followed by a group visit to Stockport (see Figures 6 and 7).

Figure 6. ‘ReFraming Experience’ project briefing with Unit X students at St Mary’s Parish Church in Stockport.

Figure 7. Unit X students discussing their observations of Stockport town center with external partner Zoetmulder.

Student groups continued to revisit Stockport on a self-directed basis to carry out further research and observations, often discussing the project with members of the public. Mid-point CRITS provided students with the opportunity to present and receive feedback on their work-in-progress from the teaching team and both external partners. At the end of the project a showcase of the students’ work was held on campus with external partners invited to attend as part of a module wide ‘Open Studios’ event.

Figure 8. ‘ReFraming Stockport’ student project outputs on display as part of Unit X Open Studio event

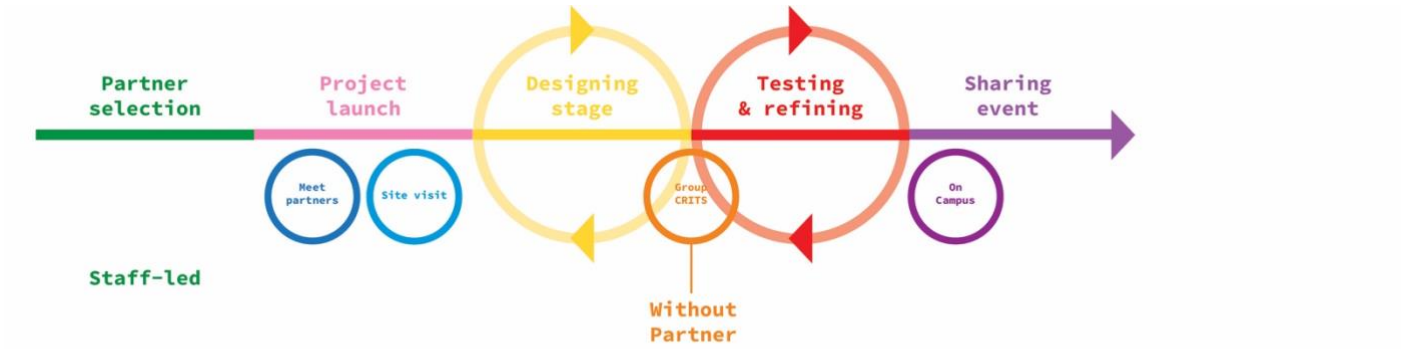

Figure 9. In the partner model (as demonstrated by Unit X project ‘ReFraming Experience‘) external partners are selected and invited into the project by staff teams and project briefs developed in relation to their practice and/or approaches to working in real-world contexts. Project launch on campus is followed by a group visit with external partners informing initial exploration of the local context. Mid-point CRITS include external partners who feedback directly to the students on their work and a final sharing event showcased student outputs with external partners invited.

Key aspects of the partner model:

- Project brief is co-developed with external partners in relation to their professional practice.

- Project broadly aligned with SCC aims, specifically in relation to cultural approaches.
- Project launch took place on campus with site visit following including external partners.
- Mid-point CRITS held on campus with external partners present.
- Project outcomes showcased as part of 'Open Studio' event on campus with external invited.

5. Community model

In the community model students work directly with a community partner to co-develop a brief aimed at creating social impact or being of community benefit. Project tutors facilitate initial pairings with students able to select their project preference to ensure buy-in.

Each year Manchester School of Architecture run 'MSA LIVE', a program that unites students from multiple programs in mixed-year teams to undertake live projects with community partners. A core group of between five and seven Masters students take the lead on brief development, delivery and co-ordination of the project with other cohorts of students joining for an two intensive 'action-weeks' at the end of the academic year. Each group produces a blog sharing the project's progress allowing community partners, tutors and wider publics to gain insight into the group's work as it develops.

In 2023/24 approximately 600 students from six cohorts in MSA worked on a total of 40 MSA LIVE projects, eight of which were connected to partners based in Stockport. These included: the transformation of vacant sites earmarked for future development through proposals for meanwhile uses (working with Stockport Mayoral Development Corporation (MDC)); the design of a customizable, modular pop-up workshop and exhibition space (working with Future Everything); the design of creative, low-budget interventions for Merseyway Shopping Centre (working with SMBC).

Figure 10. .Student created documentation of site visit from Group 21's project blog

Figure 11. Image from Group 34's blog documenting meeting with their collaborator, Future Everything.

Project aims are led by a core group of Masters students who work closely with representatives from the community partners to develop a brief that aligns with their desired outcomes. A preparation period is carried out where students consider the ethics, scheduling and budget for the two action weeks when the main design work takes place. Each group defines their own program for the action weeks, which usually includes site or community visits (see Figures 10 and 11) with students encouraged to activate engagement and participation practices as part of their work. Project outcomes are fed back to the community partners via student designed publications and presentation of outcomes shared at a collective celebration event. This event was well attended by project partners (see Figure 12).

Figure 12. .SCC stakeholders viewing students work at MSA Live 24 celebration event.

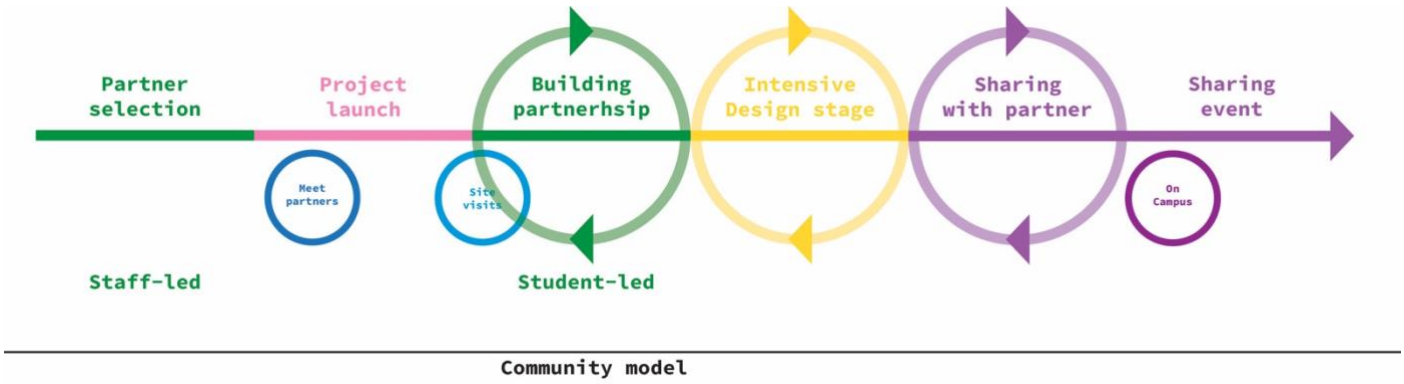

Figure 13. In the community model (as demonstrated by MSA Live 24 projects) project briefs are initiated by community partners with MMU staff making final selections and pairing partners with students for full brief development. Partnerships are built over a long lead time between core students in each group working directly with the community group or organization.

Projects remain in full consultation during project 'action weeks' with project outputs shared (and given to) the community partners at the end of the project and at a celebration event on campus.

Key aspects of the partner model include:

- Project brief is initiated by community partners and co-developed directly with students.
- Project broadly aligned with SCC aims.
- Students self-direct and co-ordinate meetings and site/community visits with community partners.
- Projects have a long lead-in time before wider student bodies join groups for intensive 'action weeks'.
- 16-page documents reporting and reflecting on the projects are produced *for* the collaborator.

6. Discussion

The student projects discussed here have been outlined in terms of how they connected with Stockport as a town, and where applicable, how they overlapped with the wider aims of Stockport Creative Campus.

The models described engaged with the communities of Stockport to varying degrees from the site-responsive model in which students responded to a 'live' site and its surrounding context to the multi-site, partner, and community models that worked with external partners in the form of cultural organisations, council representatives, and community groups. Each of the models used various methods for feedbacking back student outputs to Stockport's communities and linked external partners. External partners who fed directly into projects (feeding into project briefs and contributing to student feedback) and gave their time in doing so, were

The below table (Table 1) shows the partner types and feedback methods employed within each model.

Table 1. Summary of the four models and connected external partners for each case study student project presented in this paper.

Model	Partner	Partner type	Feedback method
Site-responsive model	None	N/A	Exhibition in Stockport
Multi-site model	SMBC	Council representatives	Presentation to partners
	Hall & Co	Stockport-based property developer	
Partner model	Zoetmulder	European design agency	Exhibition on campus (partner attending)
	Future Everything	Cultural organisation	

Community model	Heaton Mersey Village Conservation Group	Community group	Exhibition on campus (partners attending) with student reports gifted to each collaborator.
	SMBC	Council representatives	
	Marple Civic Society	Community group	
	Stockport Mayoral Development Corporation (SMDC)	Connected to the council	
	Future Everything	Cultural organisation	
	Merseyway car park (SMBC)	Connected to the council	
	SMBC	Council representatives	

In the site-responsive model project briefs were developed without external partners. Sites were selected by course tutors with the primary intention focused on opportunities posed for students' projects in relation to learning outcomes. The multi-site model is very similar but with students given a selection of sites to choose from. All sites were connected to ongoing regeneration plans in the town. In both the site-responsive and multi-site models, students undertook site visits and were encouraged to engage directly with local businesses and publics to gain a deeper understanding of the social contexts relating to each site. In seeking ways to share student work back with communities outcomes in the site-responsive model student project outcomes were showcased through a pop-up exhibition near to the original site. In the multi-site model a selection of student outcomes were shared with external partners and SCC stakeholders SMBC, and local property developer Hall & Co. These models could be considered 'light touch' operating primarily from the distant institution with minimal demands made on external partners time or resources.

In the partner model the project brief was developed in collaboration with the external partners drawing on their practices and approaches to working with communities. In the case of the 'ReFraming Experience' project only one of the partner organizations was connected with Stockport, the other was a design agency based outside of the UK. Future Everything are formally a cohort member of SCC and had spent the previous year consulting with communities in Stockport as part of an Artist commission in the town. Their position within the SCC cohort also gives them a vested interest in the student projects and their contribution to the wider SCC aims. Students were required to undertake their own research and many student groups sought opportunities to informally connect with local businesses and members of the public in the town. Final proposals were showcased through an on campus 'open studios' with external partner Future Everything attending. This event was not widely advertised and was not

particularly accessible to residents of Stockport with the University campus being approx. 7 miles from Stockport town centre.

In the community model the direct pairing of student groups and community partners implies a greater sensitivity to the desires of the people who live and work in Stockport. The longer lead-in time with lead students co-developing each project brief with the partner, allowed for greater care to be taken in considering the needs of the community partners and their linked communities. Partners are also kept in the loop during the program's 'action weeks'. Project 27 'ELEV8STOCKPORT', for example, undertook several visits in the preparation period, as well as a site visit with the group at the start of their action weeks and presentations giving at the end. The feedback given to the group from community partner Stockport MDC noted the alignment of the project outcomes with Stockport's future vision. There is an implicit trust upon the community partners in this process to fully represent the needs of their communities in co-developing project briefs. The desires of a council vs the desires of a community-led organization may vary greatly depending upon their motivations and organizational goals. The desired outcomes expressed by SMBC for Group 28's project 'MERSEYWAY FACELIFT' was to "attract a higher-class demographic" to the shopping center. This is an example of a goal that potentially doesn't reflect the needs and desires of Stockport residents living close to the shopping center. In these instances, there is an innate need for course tutors to guide students in bringing critical awareness to the brief and partner motivations.

7. Conclusion

In this working paper we have set out to question whether 'live' student projects risk perpetuating extractive practices. We have outlined four models of project-based learning using case studies of student projects delivered across MMU in the academic year 2023/24 connected to the wider project *Stockport Creative Campus* (SCC).

In the main the models discussed here engaged with either physical sites and/or external partners in the form of cultural organisations, council representatives, and community groups. As indicated in Table 1 many of the external partners in the case studies we have shared, were connected to the wider aims of SCC, either as cohort members and project leads, such as SMBC and other council linked bodies, and organisations such as Future Everything. Potter and fellow SCC team members based at the University who engaged and fed into the student projects also had an ongoing relationship with the town as a cohort member of the SCC project. Very few of the projects involved direct interaction with the communities of Stockport. Very little was 'extracted' from the communities of Stockport beyond the time given by external partner teams and some direct engagement with town centre residents and businesses by students. Connecting to organisations with no vested interest in Stockport itself could be deemed as at higher risk of extractivism.

In order to reduce the potential for extractive pedagogies, we propose the following considerations for project-based learning:

- Develop long-term relationships with external partners ensuring adequate lead-in times for brief development that reflects the needs and desires of the community.

- Include external partners and communities in as many stages of the project as appropriate acknowledging that staff from volunteer led organisations may have more limited time and resources to contribute than larger cultural and policy-led organisations.
- Ensure external partners are invited to participate in any showcases of project outcomes and if appropriate, seek to develop outputs that offer potential benefit to external partners and their communities.

All of the models described are being delivered again in 2024/25 with some of the above considerations implemented. For example, the site-responsive model (with 2nd year Architecture students) has become a multi-site model for this academic year with a second site in a different town centre location added for students to respond to. With low engagement with the exhibition of student outcomes for 2023/24 we are seeking to showcase student outcomes for 2024/25 in a more public space on the town centre high street. Since commencing the project again this academic year, physical development has commenced on the Lower Hillgate site which students have been responding to across both years. When sharing student designs with the public this could lead to some confusion, and we are conscious that members of the public may perceive the students' designs as being directly linked to the ongoing development. Expectations around this need to be managed and the speculative nature of student projects made explicit.

For 2024/25 the Partner model is being delivered with two cultural organisations based in Stockport (the 'Hat Works Museum' and a new cultural hub called 'Stockroom')with a revised project brief (co developed with these partners) inviting students to seek out and amplify seldom heard voices from Stockport's past, present, and future. In the Community Model external organisations from Stockport who proposed projects for the 24/25 academic year are all grassroots community organisations with no council or wider body involvement. This change has not been by design and simply reflects how MSA Live is a responsive model led by the desires of external partners. These projects will be reassessed at the end of the 2024/25 academic year.

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STREET LAB STRATEGIES FOR POP-UP PLACEMAKING: ENGAGING COMMUNITIES TOWARDS LASTING CHANGE

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ABSTRACT | Pop-up urban placemaking is the short-term, event-based activation of public spaces. Street Lab is a nonprofit in New York City working with communities to create, activate, and improve public space. We pop up by invitation of community groups and city agencies for several hours at a time, bringing programs to streets, plazas, and other public spaces. While activations may last only hours, they provide support for neighborhood organizations, schools, and other nonprofits who often do not have the capacity to plan, document community input, create programming, store materials, or perform maintenance.

Street Lab uses design as a central strategy to deliver immediate and impactful experiences. Beautifully designed objects help create enjoyable spaces for people to gather. Designs include pop-up libraries and drawing studios, seating, tables, play activities, and more. Objects are designed for easy transport and assembly by anyone and support flexible use by partners.

Street Lab's activations are demonstrations, showing what is possible through good design and care in a cost-effective and community-led way. Our pop-ups inspire people to come together, share their visions for public space, and work together toward lasting urban transformation.

KEYWORDS | URBAN TRANSFORMATION, PUBLIC SPACE, DESIGN, COMMUNITY ENGAGMENT, PLACEMAKING

1. Introduction

In New York City, where private outdoor space is scarce, making vibrant and safe public spaces essential to community wellbeing, and the activation of those spaces central to their success. Street Lab is a nonprofit that pops-up in New York City, transforming public spaces for only a few hours on streets and plazas in partnership with local community groups. Street Lab envisions a city filled with public spaces that inspire, where people can gather in every neighborhood. To make this vision a reality, Street Lab relies on design to provide people with good experiences in public space, show care to communities, and to soften and transform the urban streetscape. Guided by a commitment to ethical leadership, Street Lab works by invitation, ensuring that its presence supports community-led goals and reflects a deep respect for local voices. Through this approach, organization creates demonstrations that catalyze change and help foster lasting transformations.

2. Street Lab Strategies

Founded in 2006 as a pop-up library in Boston, Street Lab moved to New York City in 2011. (Street Lab/about, n.d.). During the COVID-19 pandemic, it expanded alongside the city's Open Streets program when the city began issuing permits to community organizations to close certain streets to traffic. Some funding was distributed to organizers of those streets, but it was not sufficient to maintain upkeep and programming (Streetsblog, 2024). Street Lab is unique in that we create custom objects and program designs, and we are a service provider to New York City agencies. As Design Lead, I create custom designs that can be deployed in public spaces by invitation of community groups, NYC's Department of Transportation (DOT), and other agencies. We provide staff for our pop-ups that set up, clean up, and run programs.

This paper focuses on Street Lab post-2020, when New York City drastically changed its approach to public space in response to the COVID-19 pandemic. However, Street Lab has been using design to activate public space long before that, including one of the most iconic objects: the Uni carts and benches by architecture firm Höweler + Yoon (Street Lab/design, n.d.). Street Lab sells kits to others across the United States interested in fostering similar engagement in their communities.

2.1 Why Pop-Ups?

Pop-ups show the power of street transformation in an immediate way. Change in the urban environment can be slow, with many permits and permissions needed to approve more permanent plans. Pop-up is a "now" approach, reactive to the infrastructure and programming needs of a particular place. Many community organizations lack capacity to program spaces, store and replenish materials, or staff to maintain materials and infrastructure. Sometimes neighbors do not agree on community priorities (Transportation Alternatives, 2020), while pop-ups can engage communities and encourage consensus toward a shared vision, valuing experimentation to understand what works in a specific space. Street Lab works with a network of partners whom we connect to share resources and ideas to help inspire and strengthen one another. In most low-and middle-income areas, these pop-ups are free to the community, paid for with funding from the Department of Transportation (DOT, 2024).

Figure 1. Street Lab on Jennings Street in the Bronx, NY. Photo credit: Street Lab

2.2 The Role of Design

Street Lab uses design as a central strategy to demonstrate immediate and impactful transformation. We create beautifully designed objects and programs using premium materials including libraries, social seating, tables for dining and activities, objects for play, and community engagement kits. A set of principles guides the design process at every phase of development and serves as a rubric to continuously evaluate ideas. The rubric is first used to determine whether to pursue a new project. Design projects must stay true to the mission of the organization, as well as work within available capacity. Once the initial design is complete, we evaluate whether the concepts continue to meet these goals, and a third time once we have a prototype. Some items on this rubric include:

- Simple and emotional
- Walk-up, drop-in and open-ended
- Scalable and replicable
- Softens the urban landscape
- Makes an attraction
- Gives the community something
- Materially responsible (carbon footprint, repair, reuse, efficiency, end of life)

In addition to these criteria, we design according to the realities of moving and storing equipment in New York City. This creates a set of constraints that help guardrail the design process. They include:
Must be portable within our capacity (van or lift-gate truck if needed)

- Should fold, pack-flat, or stack (or similar)
- Assembled easily by 1-2 people
- Operable/programmable by staff and partners
- Ease of maintenance and repair

Street Lab employs a version of the “quicker lighter cheaper” approach, a term coined by Eric Reynolds, which describes a strategy harnessing the creative energy of the community to quickly and inexpensively transform spaces toward new uses and possibilities. (Project for Public Spaces, n.d.) We use this approach for materiality as well,

to specify designs that are lightweight, yet suitable for constant public use.

Birch plywood is a primary material because it is inexpensive, durable, and creates warmth in the urban landscape. Plastic is used sparingly for environmental reasons, but sometimes is the most practical choice where lightness and strength are most important. For example, Street Lab's stacking benches are fabricated using CNC-cut polypropylene, and are one of our most requested designs, and a best-seller to others, as they are easy to move and store. While converting these to wood or other materials has been discussed, a suitable design has yet been developed that can compete with plastic. Where possible some designs in plastic are being converted to recycled HDPE, though it is expensive and not easily available.

Materiality is central to our design strategy. Designs are meant to move and be used together in different combinations, inspiring community members to adapt designs for their own use, create new uses, or combinations that work for them. This helps partners consider how spaces should evolve without the pressure of a long planning process or great expense. Materials feel premium which creates a sense of excitement and shows care towards the community. There is a sense that something special is happening that is not experienced with generic folding tables and tents.

2.3 Program Design

In addition to physical design, Street Lab designs programs that activate these objects following similar principles to those used for physical designs. Street Lab offers 14 programs, each referenced by words like READ or PLAY. Generally, designs serve multiple programs: Carts can be libraries or art studios for READ and DRAW, respectively. Tables used for BUILD, our block construction program, are also used for EXPLORE, a nature program with microscopes and specimens. We use the same tables for WRITE, a program featuring typewriters. Each program uses materials constantly cared for and refreshed. READ is often curated along themes from our extensive library featuring books in a variety of languages that are tailored to different locations and populations. Objects also support the programs of partner organizations who pop-up alongside us, and adaptive reuse by community members.

2.4 Community Engagement

According to the American Planning Association, "pop-up designs and activations are successful when diverse community members are engaged in the process from beginning to end, including the implementation of the final design. Community engagement ensures that the pop-up designs and activations relate to local priorities and needs." (Pena, 2021)

At Street Lab, all designs are informed by the communities we work with, but it is not strictly a codesign process. Our equipment must work in multiple neighborhoods, be flexible for various uses, and be usable by anyone. Multiple communities are engaged in the development of designs and programs through unique feedback loops that come with long-lasting partnerships. Staff engages with the community at activations, listens to their thoughts and vision, learns how existing programs are operating in various places, and any pain points with equipment deployment or use. We have created a physical framework and program to formalize this process, called IMAGINE, which has been developed over several years in collaboration with our partners. This approach echoes urban writer and activist Jane Jacobs' belief in the importance of local knowledge and

the value of observing and responding to the "intricate sidewalk ballet" of neighborhood life—a philosophy that prioritizes organic, community-rooted development over top-down planning (Jacobs, 1961)

Figure 2. Street Lab engages with community using an IMAGINE prototype. Image credit: Street Lab.

2.5 New Public Spaces

In addition to design and programming, Street Lab works with local partners and the DOT on a New Public Spaces initiative (NPS). We work with a partner to secure permits, understand needs, and build consensus around the space through a mix of support, program, and design utilizing co-design methods. Partners include public schools, local government, community organizations, and neighborhood associations who reach out to us to participate. Street Lab's staff visits the site, helps with communication and outreach, and recommends and delivers programs and designs to pilot a space. Then we pop-up: Street Lab sends staff and equipment regularly over months to pilot the site. If the partner can store equipment, we lend objects and programs long-term. The goal is to transition the site so the partner and community can take ownership and continue with planning and management, while we continue to support programming and infrastructure as requested.

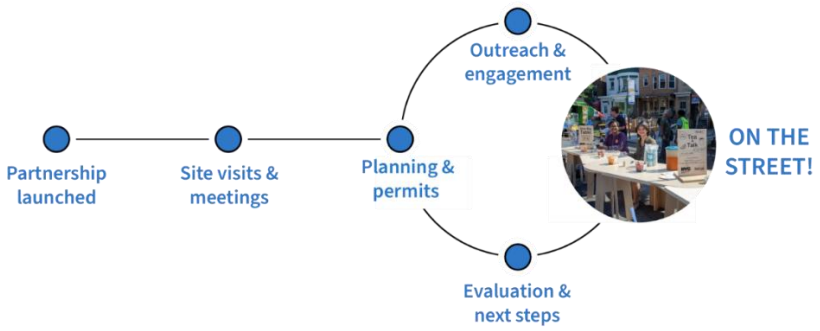

Figure 3: New Public Spaces process. Image: Street Lab

3.Examples

There are numerous examples where Street Lab's work with communities has helped create lasting change. The following examples show how Street Lab designs can help transform public spaces in meaningful ways. These examples share different types of partnerships and spaces, in different neighborhoods.

3.1 Beverly Triangle, Kensington, Brooklyn, New York

Beverly Road Triangle in Kensington, Brooklyn is an example of how pop-ups demonstrate possibility. This triangle became an Open Street in 2020, adjacent to an existing plaza. A local neighborhood association worked with New York City Councilmember Shahana Hanif to advocate for the transformation of this space into a permanent public plaza. Street Lab helped demonstrate what this transformation could look like by creating weekly activations during Summer 2022 using a variety of existing programs and designs. We piloted two new prototypes, including One Big Table (OBT), a modular and scalable approach to outdoor dining and gathering, and IMAGINE, our community engagement toolkit.

Beverly Road has several restaurants lacking outdoor spaces and a large market. We hosted a "tea and talk" using OBT with the Councilmember, featuring food from these local establishments. Community groups participated in pop-ups as well: the Bangladeshi Ladies' Sewing Club used the tables to meet and work on patterns, and cyclists returning from a ride stopped to enjoy a snack and chat with neighbors (figure 4).

Figure 4: One Big Table, PLAY on Beverly Road, Summer 2022. Image credit: Street Lab.

We brought an early prototype of the IMAGINE toolkit. Street Lab has long used Polaroid cameras and prompt cards to capture and share people's ideas and aspirations. Some prompts might include “Dear New York City, on this street I want to…” or “What does this street mean to you?” (Street Lab/imagine, n.d.). People affix cards to the outside of our carts to inspire others to do the same, creating an asynchronous collaborative experience. In Kensington, a simple three-panel board was assembled for displaying cards asking people to share their ideas for Beverly Road (figure 5). We used these cards to communicate support to the DOT. The answers were incredibly moving and celebratory of the diverse residents of the community, advocating for both active and cultural programming. Activating space with prototypes allows us to both test ideas and deliver new designs very quickly.

Street Lab was not solely responsible for community engagement at this site. The neighborhood association created surveys, and DOT created a survey for a quantitative understanding. Street Lab's engagement is generally qualitative, focused on sharing stories. Per the survey conducted, 82% of people surveyed (of a total number unknown) were in favor of the street becoming a public plaza, with some concerns about ongoing maintenance and programming (DOT, 2023). In Summer 2023 the site became an official plaza. We continued to program as requested, while maintenance and plantings were managed by the Horticulture Society, another DOT partner. It took many groups and people to help turn this Open Street into a plaza with Street Lab's work demonstrating potential when activated with people and gathering helped lead to its success.

Figure 5. A community member shares ideas using the IMAGINE prototype. Image Credit: Street Lab

3.2 34th Avenue Open Street, Jackson Heights, Queens, NY

34th Avenue in Jackson Heights is the longest Open Street in New York City at over a mile long. It began in 2020 and has been praised as the "gold standard" for Open Streets by the DOT and others (Bartolini, 2022). Since then, the street has been completely redesigned with some blocks entirely closed to traffic, speed calming measures, and new bike lanes. It has a huge volunteer force of community members, the 34th Avenue Open Streets Coalition (34AOSC), who help to program the street. In 2020, many volunteers worked from home and helped create programming, storing supplies in their apartments. Street Lab developed our PLAY kit in March 2020 in response to the pandemic. We partnered with DOT, who were planning to launch Open Streets in July 2020 when playgrounds were still closed. PLAY is an obstacle course that can be customized with chalk drawings on the asphalt, and can be reconfigured many ways. As social distancing measures eased, we brought additional programming. 34AOSC acquired storage, and they now own one of the original PLAY prototypes (Figure 4), as well as our tables which they use regularly. All of the objects are designed with flexibility to empower partners to use and adapt any way they like to be most impactful for their space.

Figure 6. PLAY kit prototype on 34th Avenue Open Street, Spring 2021. Image credit: Street Lab.

We refer to 34AOSC as a "pro" partner, one that can pop-up on their own with our equipment. 34AOSC were also partners for a special project created as a fellowship I completed at Pratt Institute, using a co-design process to work with seniors and families on 34th Avenue towards new active designs for a multigenerational community (Crespo, 2024). We learned that people needed places to rest in order to be active on the street. This project developed into One Big Bench (OBB), a modular and scalable kit of benches featuring supportive seating elements that has multiple configurations. 34AOSC kept the original OBB prototype which they use for social seating as well as audience seating for performances and events. In cases like 34th Avenue, adding objects that they can easily store, or that we can deliver when they have larger events helps them to provide amazing experiences and services to their community.

3.3 New Public Spaces at New York City Public Schools

Public School 32 (PS32) is in the public system serving children grades kindergarten through Fifth in the Bronx. PS32 has been partnered with Street Lab for 3 years and was among the first of our New Public Spaces sites, starting during the COVID-19 pandemic.

Jim Lammers, then one of Street Lab's program staff, partnered with PS32 and Street Lab for his master's thesis (Lammers, 2023), to develop an engagement framework for their Open Street. Lammers later joined Street Lab's office team as a project manager. We built on his thesis work to develop the IMAGINE program with activities and co-design workshops engaging students and staff. Taking some learnings from Beverly Road, IMAGINE panels were redesigned to be more lightweight and transportable to support workshops on the street in a more engaging way (figure 5). We developed a share-back strategy using the panels for display, and teachers started using them for outdoor lessons.

Figure 7. PS32 students share visions for their street using the IMAGINE toolkit. Image credit: Street Lab.

PS 32 also helped to inspire a new design. In one of Lammers' workshops, students built a consensus around creating a water park on the street. Lammers asked them to think about how they might create this, who might help, and what kinds of permissions they would need. To bring their vision to life, we helped PS32 pilot a waterpark for an year-end festival by bringing sprinklers, hoses, and other water activities. We began to think about water and cooling on the street and how to create a program incorporating water. There is a long history of communities opening fire hydrants to cool off in summer. Street Lab decided to pursue a more passive, less water-intensive system using a hose or hydrant, and created a modular misting river. We added a mobile landscape of native plants and named the program OASIS. We brought a prototype to field day at PS 32 in Spring 2024, and continue to use this program all over the city to cool people on the hottest days. (Street Lab, 2024)

After three years of partnership with PS 32, the school has taken over management of the site. What started with one teacher as leader of the Open Street has now grown to become a full support team of teachers and staff to handle permitting and organization

of the street. We also partner with Equity Design, who specialize in fitness programming. PS32 created an Open Streets Ambassador program made up of children in grades 2-5 who set up the street and plan programming (figure 8). This teacher is also creating a guide for schools Open Streets best practices and is working with Street Lab to develop and share it more broadly. We continue to bring our equipment and programs, but PS32 now handles the rest.

Figure 8. Children at PS32 often assemble One Big Table themselves. Image credit: Street Lab

4. Evaluation

Street Lab uses design and programming to create street transformation. It is important to note that most times, multiple programs are deployed together to create full street activations and options for everyone to enjoy. Measuring impact is complex, influenced by factors like weather and concurrent events. We assess impact based on feedback from our street staff, partners, and the public using head counts, surveys, and interviews to understand which programs "encourage community gathering, increase people's sense of safety and make places more welcoming and accessible to all" (Street Lab, 2024). We look for markers that indicate a positive experience, a sense of safety, and community cohesion. Our partners help assess our designs and programs and collaborate with us to iterate our offerings to deliver the most impactful work.
of lasting urban transformation within New York City. Together, these processes support lasting urban transformation in New York City by modeling community-led public space change and building local capacity so that each neighborhood can develop its own vision for its streets.

5. Conclusion

In 2024, Street Lab popped-up 535 times with 73 partners in 93 locations. Over 26,000 New Yorkers participated in these pop-ups (Street Lab, 2024). We will increase that number in

2025, continuing to respond to the needs of our partners and add to the catalog of designs and services on offer. Street Lab's work exemplifies the power of pop-ups as a strategy for meaningful public space transformation. These temporary interventions serve as demonstrations, sharing the potential of well-designed and inclusive spaces to have a positive impact on the communities that share them. Our model offers a replicable, community-driven approach that fosters social connection and equity, and leads to meaningful and long-lasting change where communities are empowered to have ownership of their public spaces. The success of these efforts reflects an ongoing commitment to ethical leadership that centers trust, collaboration, and respect for communities, and highlights the importance of design and community action in shaping the public realm.

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Tacit Knowledge in Clothing Design: A Phenomenological Analysis of the Dressing Issues of Chinese Female Wheelchair Users

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Abstract: Clothing goes beyond body-covering. Psychologically, it enhances wearers' confidence and self-identity; socially, it significantly impacts interpersonal relationships and social cognition. However, the dressing difficulties of people with disabilities are often overlooked. This paper centers on the dressing problems of the specific group of female wheelchair users in China. Through in-depth interactions with seven female wheelchair users in the form of a focus group, and by using Colaizzi's phenomenological analysis method to conduct an in-depth analysis of the textual data, it reveals the unique challenges this group encounters during daily dressing and the coping strategies they employ. Ultimately, three core themes are distilled: "Physical Limitations and Movement Skills", "Clothing Modification and Tool Adaptation", and "Social Interaction and Psychological Adjustment". This research uncovers the tacit knowledge amassed by female wheelchair users in their dressing practices. Stemming from their real-life experiences, this knowledge is pivotal for comprehending the needs of this group. It helps designers better recognize these needs, promotes the development of clothing designs and assistive devices, and improves the public environment. Moreover, it positively contributes to social inclusivity and the enhancement of their quality of life and social integration.
(Keywords: Chinese Female Wheelchair Users; Clothing Design; Phenomenological Analysis; Tacit Knowledge; Dressing Issues)

1. Introduction

As societal attention to the disabled grows, the quality of life and rights protection of special groups have emerged as significant social issues. For female wheelchair users, clothing is not just for warmth and beauty; it is integral to self-identity and social interaction. Yet, physical and social barriers pose distinct dressing challenges. China's disabled-oriented clothing market is nascent, with slow progress in design and research. Existing garments often lack style, failing to meet their aesthetic desires, and are designed from able-bodied perspectives, mismatching actual needs. Previous research mainly focused on functional or inclusive design based on general physical requirements, neglecting the tacit knowledge female wheelchair users accumulate while dressing. This knowledge, rooted in their unique experiences, is crucial for understanding their clothing needs and living conditions. This study aims to systematically uncover this "tacit knowledge," presenting a vivid picture of their dressing experiences. It seeks to inspire innovation in disability-focused clothing design, enabling the creation of products that better fit their physical and aesthetic needs.

2. Theoretical Foundation of Phenomenological Analysis

Inspired by his teacher Franz Brentano, Edmund Husserl founded phenomenology in the late 19th century, defining it as the study of "the essence of conscious experience, especially intentional experience" with the core principle "returning to the things themselves". Unlike traditional empirical methods, it focuses on conscious appearances as a whole, rather than breaking them into parts. Key concepts in Husserl's system include natural attitude (unreflective daily interaction), intentionality (consciousness directed at an object), and phenomenological reduction (suspending judgment to reveal essence). Phenomenology posits that reality is constructed by inner conscious perception, balancing subjectivity and objectivity. Through phenomenological reduction, it can distill universal essences from diverse individual experiences. As a theoretically rich research approach, phenomenology offers a unique lens for studying the dressing experiences of female wheelchair users. By focusing on their lived experiences, setting aside biases, and exploring the subjective meanings of dressing, it enables a deeper understanding of their clothing needs, challenges, and the tacit knowledge embedded in daily dressing.

Phenomenological analysis examines lived experiences, suspends biases, and uncovers the essence of phenomena by leveraging diverse materials (e.g., pictures, videos, texts) collected through interviews, observations, or group discussions. There is no one-size-fits-all approach; rather, multiple descriptive methods exist, such as those by Giorgi and Giorgi, Moustakas, Colaizzi, and Sundler. Given its wide use in health-related research, this study will employ Colaizzi's 7-step analysis method (Table 1).

3. Research process

This study employed a focus-group method to investigate the dressing challenges faced by Chinese female wheelchair users. In collaboration with the Qingdao Barrier-free Environment Promotion Association, the research team organized the "Inclusive Fashion Co-creation Camp", recruiting 7 female wheelchair users interested in fashion design. Guided by a professional moderator, the 2-hour session centered on "daily dressing difficulties" and "coping strategies", enabling participants to share their experiences and insights. The discussions were recorded, transcribed by two assistants, and cross-checked by the principal researcher to ensure accuracy. Participant details are in Table 2.

Subsequently, data analysis followed Colaizzi's 7-step phenomenological method. To enhance authenticity, 2-3 representative original statements were inserted into each theme description. The core of Colaizzi's method, involving collecting, comparing, and extracting similar viewpoints to form concise themes, was crucial for achieving phenomenological reduction.

Finally, research findings were presented to participants via online video conferencing. The derived themes comprehensively reflected the participants' daily dressing realities, validating the study's effectiveness.

4. Conclusion

This study employed a phenomenological analysis method to explore the daily dressing experiences of female wheelchair users, identifying three key themes: "Physical Limitations and Movement Skills,""Clothing Modification and Tool Adaptation," and "Social Interaction and Psychological Adjustment."(Table 3)

4.1 Design Considerations Based on Physical Abilities and Behavioral Habits

Wheelchair users often experience limited limb mobility and prolonged sitting, resulting in impaired blood circulation and pressure-induced skin discomfort. Therefore, clothing design should prioritize soft, breathable, warm, lightweight, and highly elastic fabrics. Adequate space should be reserved in areas such as the armpits and knees to facilitate movement. Given their close interaction with wheelchairs, clothing design must avoid long or wide hemlines and loose decorations to prevent entanglement with wheels. Additionally, bottom wear should be designed for easy wear and removal while maintaining comfort and decency, addressing their toileting needs.

4.2 Design Ideas Drawn from Self-modification and the Use of Assistive Tools

The self-modification practices of female wheelchair users provide valuable insights for designers, highlighting the importance of adaptability and adjustability in size and structural design. Furthermore, the use of assistive dressing tools suggests that clothing design can incorporate structural elements compatible with such tools, enhancing usability and independence.

4.3 Design Principles Aligned with the Need for Social Integration

For female wheelchair users, clothing serves not only as a functional necessity but also as a medium for social integration and self-image expression. Designers should align clothing with current fashion trends, avoiding over-design or styles reminiscent of nursing-type clothing. Excessive design complexity may hinder ease of wear and usability, while stereotypical nursing-style clothing can exacerbate feelings of social exclusion. Therefore, designs should balance functionality with public aesthetics, promoting confidence and social participation.

4.4 Significance and Limitations

These themes vividly represent the real-life dressing situations of female wheelchair users, revealing the tacit knowledge within their dressing practices. This knowledge is crucial for clothing design, helping designers understand users' experiences and needs, thus making designs more practical. Phenomenological analysis allows researchers and designers to explore deeper-level user needs, facilitating the identification of design requirements and innovation.

However, the study has limitations. With only seven participants from Qingdao, despite meeting the minimum sample-size requirement for phenomenological analysis, the findings' generalizability is limited. Future research should expand the sample size, including participants from various regions, cultures, and socioeconomic backgrounds. This will improve the conclusions' representativeness and offer more comprehensive guidance for designing clothing for this group.

5. Conceptual design: Modular Clothing for Wheelchair Users

Based on the previous theoretical research and user research, the author has carried out a design exploration of modular clothing for wheelchair users (as shown in Figure 1). This design demonstrates remarkable flexibility and operability in terms of meeting the needs of easy wearing and taking off, adapting to different scenarios, and functional compatibility.

The modular design consists of fixed modules and variable modules. The fixed modules mainly address the issues of easy wearing and taking off as well as convenient toilet use, forming the main part of the clothing. The design of the combination mechanism aims to be as streamlined as possible. A series of modular clothing usually includes 3 to 4 variable modules. Excessive connection interfaces will reduce comfort and increase the complexity of use. The design of variable modules can start from aspects such as style, color, texture, and function, and carry out serialized design. The materials of the clothing for wheelchair users should be soft and lightweight. In terms of the connection method, considering the behavioral characteristics of long-term sitting and lying down, the connection interfaces should be avoided on the contact surface between the body and the wheelchair to prevent pressure marks and pressure sores. Users can match and use the corresponding module combination schemes according to different needs in daily life

This design has three major advantages: easy wearing and taking off, easy washing and changing, and personalized matching. The modular structure allows for the disassembly of specific parts, achieving easy wearing and taking off and convenient local washing and changing, which improves the practicality and hygiene of the clothing. At the same time, the modular design can combine functional modules according to the specific needs of users, realizing personalized matching of styles and functions.

Table 1. Colaizzi's 7-step phenomenological analysis method

1. Familiarization	The researcher thoroughly familiarizes with and understands all the content provided by the research participants through repeated and careful reading of the collected data.
2. Identifying significant statements	Analyze the data word by word, identify and extract important and meaningful statements related to the research questions.
3. Formulating meanings	The researcher constructs/codes the meanings of the recurring viewpoints, but tries to "bracket" as much as possible the pre-assumptions they already have related to the phenomenon.
4. Clustering themes	Gather the coded viewpoints, search for meaningful common concepts, and form the embryonic form of themes. At this time, it is still necessary to "bracket" one's own existing ideas or experiences, especially the theoretical knowledge from the literature.
5. Developing an exhaustive description	The researcher needs to provide a detailed description of each theme generated in Step 4 and can extract and include typical original statements from the participants.
6. Producing the fundamental structure	Put similar themes and their descriptions together for repeated comparison, distinguish and extract similar viewpoints, and then construct a short and meaning-dense phrase, that is, a theme.
7. Seeking verification of the fundamental structure	Return the generated theme structure to the research participants for verification, asking whether their true experiences have been captured to ensure the accuracy of the results. If there are deviations, the researcher must start from the first step and re-analyze step by step.

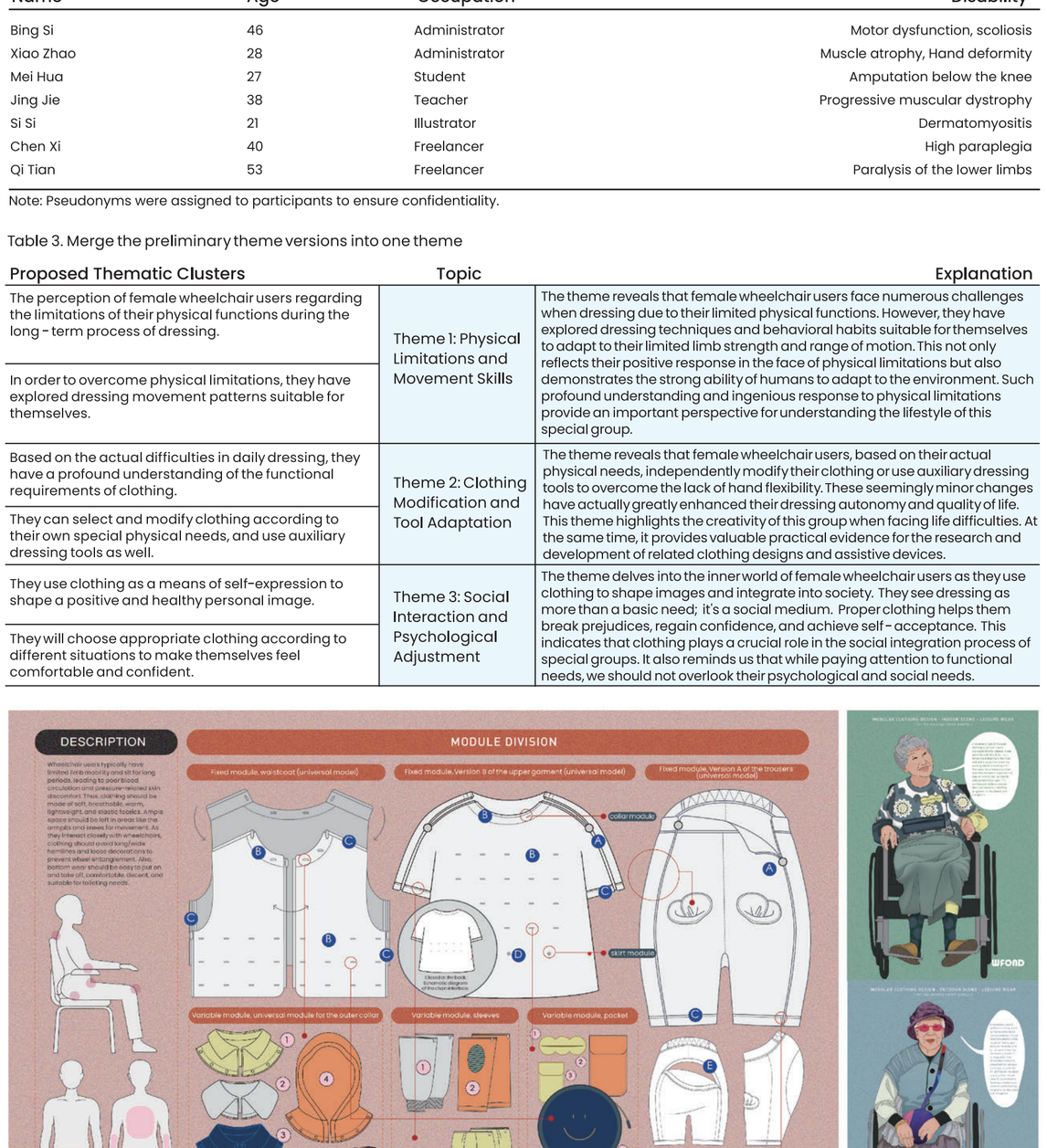
Table 2. Sample demographics

Name	Age	Occupation	Disability
Bing Si	46	Administrator	Motor dysfunction, scoliosis
Xiao Zhao	28	Administrator	Muscle atrophy, Hand deformity
Mei Hua	27	Student	Amputation below the knee
Jing Jie	38	Teacher	Progressive muscular dystrophy
Si Si	21	Illustrator	Dermatomyositis
Chen Xi	40	Freelancer	High paraplegia
Qi Tian	53	Freelancer	Paralysis of the lower limbs

Note: Pseudonyms were assigned to participants to ensure confidentiality.

Table 3. Merge the preliminary theme versions into one theme

Proposed Thematic Clusters	Topic	Explanation
The perception of female wheelchair users regarding the limitations of their physical functions during the long-term process of dressing.	Theme 1: Physical Limitations and Movement Skills	The theme reveals that female wheelchair users face numerous challenges when dressing due to their limited physical functions. However, they have explored dressing techniques and behavioral habits suitable for themselves to adapt to their limited limb strength and range of motion. This not only reflects their positive response in the face of physical limitations but also demonstrates the strong ability of humans to adapt to the environment. Such profound understanding and ingenious response to physical limitations provide an important perspective for understanding the lifestyle of this special group.
In order to overcome physical limitations, they have explored dressing movement patterns suitable for themselves.		
Based on the actual difficulties in daily dressing, they have a profound understanding of the functional requirements of clothing.	Theme 2: Clothing Modification and Tool Adaptation	The theme reveals that female wheelchair users, based on their actual physical needs, independently modify their clothing or use auxiliary dressing tools to overcome the lack of hand flexibility. These seemingly minor changes have actually greatly enhanced their dressing autonomy and quality of life. This theme highlights the creativity of this group when facing life difficulties. At the same time, it provides valuable practical evidence for the research and development of related clothing designs and assistive devices.
They can select and modify clothing according to their own special physical needs, and use auxiliary dressing tools as well.		
They use clothing as a means of self-expression to shape a positive and healthy personal image.	Theme 3: Social Interaction and Psychological Adjustment	The theme delves into the inner world of female wheelchair users as they use clothing to shape images and integrate into society. They see dressing as more than a basic need; it's a social medium. Proper clothing helps them break prejudices, regain confidence, and achieve self-acceptance. This indicates that clothing plays a crucial role in the social integration process of special groups. It also reminds us that while paying attention to functional needs, we should not overlook their psychological and social needs.
They will choose appropriate clothing according to different situations to make themselves feel comfortable and confident.		



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THE TATTAS PROJECT: PROMOTING EARLY BREAST CANCER DETECTION THROUGH POSITIVE DESIGN.

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ABSTRACT | The Health Ministry of Colombia states that 57,5% of the annual cases of breast cancer in Colombia are noted late, highlighting the need to work more on early detection (Castilla, 2021). The main reason that increases hesitation to perform the self-exam is self-imposed barriers. Therefore, the *Tattas* project applies a Positive Design framework to address these barriers through a design that fulfils the needs of autonomy, beauty, security, and community. It strengthens the four dimensions of self-care agency: self-awareness, initiative, knowledge-seeking, and passivity. With the *Tattas* methodology, we achieved self-awareness, increased self-exam knowledge by 60%, provided guidance, reduced anxiety through self-touch, and fostered a supportive environment encouraging women to invite others to perform the self-exam. Therefore, *Tattas* introduces a replicable methodology for health education models that can improve accessibility to breast self-examination and empower women to take proactive control of their health.

KEYWORDS | SELF-CARE AGENCY, POSITIVE DESIGN, AUTONOMY, SELF-EXAMINATION, SELF-IMPOSED BARRIERS

1. Introduction

Self-imposed barriers related to conscious or unconscious obstacles are one of the main limitations for women performing breast self-examinations (Ceballos & Giraldo, 2011). These barriers are associated with beliefs, attitudes, behaviours, or social circumstances. Have you ever performed breast self-examination? Do you know how to do it? Usually, the answer to these questions is "NO". Fear, taboos, and misinformation are common concepts around breast self-examination, making self-exploration an uncommon practice (Castilla, 2021).

In 2022, there were 2.3 million women diagnosed with breast cancer and 670.000 deaths globally (WHO, 2024). Only in Colombia by 2020, 15.509 new cases of breast cancer and 4.411 deaths were registered (Escallón, 2023). In addition, the Health Ministry of Colombia stated that in 2021, 57,5% of these cases were noted late, highlighting the urgent need to work more on early detection (Castilla, 2021). Despite the existence of breast cancer awareness campaigns, their impact remains limited. These initiatives are often confined to specific dates, such as October 19, and rely on generic impersonal formats emphasising medical terminology. As a result, these initiatives have low effectiveness, and early detection rates remain insufficient. The *Tattas* project, with its focus on early detection, is a crucial step in addressing this issue.

Fear is the main barrier to self-examination. Medical language, limited information, and cancer-related stereotypes reinforce negative narratives, increasing hesitation, guilt, and insecurities. Similarly, Radhakrishnan (2024) found that some participants in India avoided the procedure due to embarrassment, forgetfulness, or lack of privacy. Our research explores how to inform people about breast self-exams to promote body awareness and early detection. This project connects emotional and physical well-being to inspire preventive health practices, transforming self-exams into a meaningful self-care routine with a clear message: raise awareness, not fear.

According to Pang (2022), fear can be managed by introducing self-touch as a self-calming technique that reduces the emotional load. However, as this fear is strongly related to self-imposed barriers, it is necessary to cultivate self-care agency. To address that need, we adopt a four-dimensional view of self-care agency (Kearney & Flesicher, 1979) and the Positive Design Framework (Desmet & Pohlmeyer, 2013). The self-care agency dimensions are (a) achieving self-awareness, (b) developing an initiative and self-responsibility, (c) having knowledge and a sense of information-seeking and curiosity, (d) achieving passivity, an inertia behaviour where the self-exam becomes a habit. By learning and appropriating these stages, women will create self-care behaviours and gradually build confidence and familiarity with self-touch.

Positive Design aims to enhance human flourishing by addressing pleasure, personal significance, and virtue. These approaches highlight the role of design in promoting well-being and ethical leadership and facilitate the evaluation of social, economic, and political impacts, ensuring that innovative strategies prioritise care and public well-being. One of the 13 fundamental needs used to understand self-examination is autonomy. Autonomy is the cause of one's actions and feeling that one can do things in one's way (Desmet & Fokkinga, 2020). This need plays a leading role in fostering self-care agency, empowering individuals to take ownership of their health and well-being.

This article describes the *Tattas* project. A project in which women are encouraged to approach breast self-examination as an act of autonomous self-care while also addressing other fundamental needs: (1) beauty by offering a product that brings unity and order to the practice through its thoughtful and attractive design; (2) A sense of security, by empowering women to take an active role in their health through consistent self-exams; and (3) community, by creating a safe space where fears and doubts rooted in taboos can be openly shared and addressed, all of which contribute to enhancing self-care agency and well-being.

2. The beginning of our research

The question that initiated our research was why women in Colombia often do not perform breast self-examinations. To explore this, we surveyed 58 women aged 17 to 60, with the majority (53%) between 18 and 30. The results are presented in Figure 1.

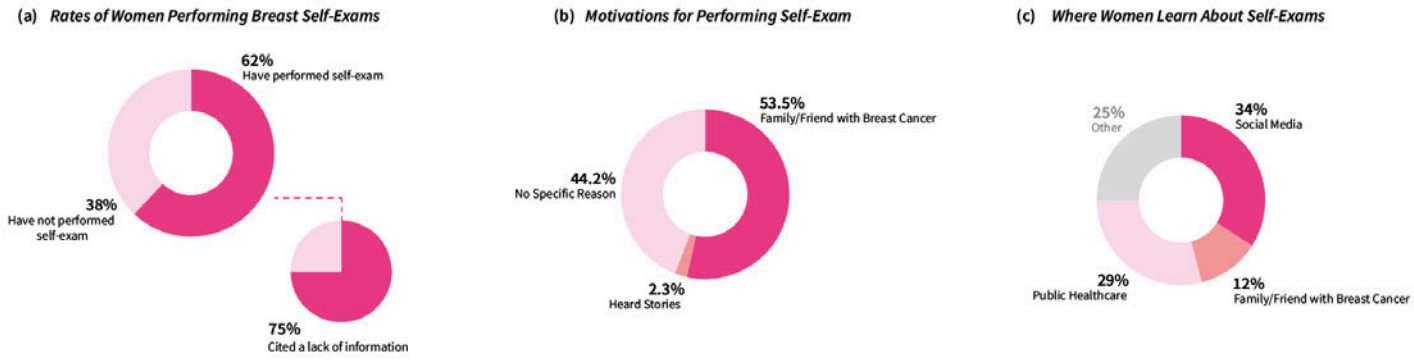


Figure 1. Results from an initial survey involving 58 women aged 17–50 exploring: (a) frequency of self-examination practices and availability of reliable information; (b) primary motivations behind performing the self-exam; and (c) main channels used to acquire self-exam knowledge. Responses highlight significant gaps in the regularity of practice, limited information on self-examination, and indicate that 44.2% of women do not perform self-exams due to a lack of personal connection to breast cancer.

While the survey gave us an initial understanding of the context, it also raised additional questions. We wondered why women continued to experience uncertainty despite the available information, their emotional state during the self-exam, and whether fear played a role. To explore these questions, we conducted interviews using a tool we developed called the Body Emotion Cartography (BEC) tool, which was key to understand how the relationship with the body influences self-care and self-exploration.

The BEC tool was designed to map emotions within the body. It enables participants to identify where and how they feel specific emotions while fostering personal reflections on the underlying reasons for these feelings.

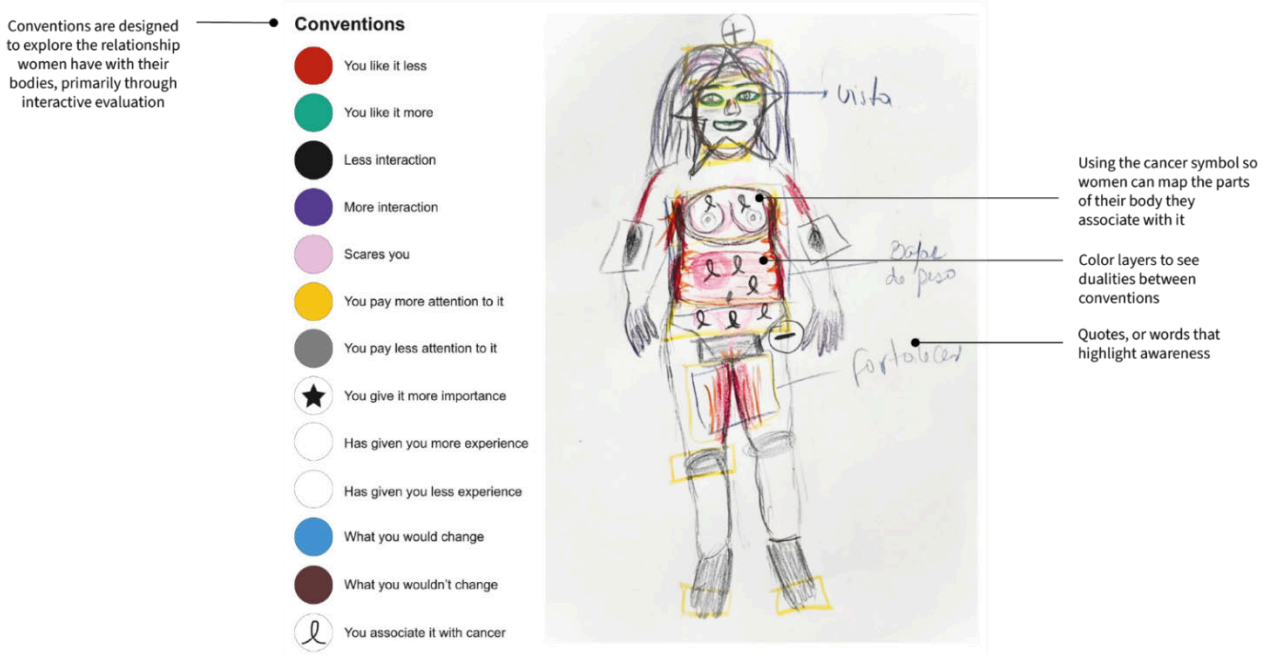


Figure 2. First iteration of the Body Emotion Cartography (BEC) tool showing visual conventions participants used to map emotional perceptions about their bodies and breast cancer during initial interviews. This tool enables participants to explore emotional dualities within their bodies, thus encouraging self-awareness.

The interviewer instructed the participants to draw their silhouettes first. Next, they used a set of conventions, as shown in Figure 2, and had approximately 15 minutes to map their emotions on the silhouette. The interview concluded with a question about how their relationship with their bodies influenced their engagement in breast self-examination.

This approach allowed women to speak more deeply about why self-exploration was limiting and generating uncertainty. They mentioned taboos surrounding the topic and how this lack of dialogue left them unsure about whom to approach for advice or information. These conversations provided a clearer understanding of the self-imposed barriers women face when self-examining.

Overall, this initial research led us to three key insights. First, self-awareness is essential for self-care, as there can be no effective self-care without a deep understanding and knowledge of one's body. Secondly, barriers to open dialogue persist, as self-exam remains tied to taboos despite being a health-related topic, limiting conversations and making it a rarely shared subject. Finally, the word "cancer" carries significant emotional weight, causing fear and uncertainty. These insights highlight the need for education on the topic, focusing on addressing fear without resorting to scolding or judgment.

3. The *Tattas* Project

The *Tattas* Project empowers women to take the first step in practicing breast self-examination with confidence. The project combines a practical kit and workshops to encourage consistent self-examination and early detection habits. The kit was designed with the essential factors for designing health products defined by Henriquez and De Francisco (2020). We use the analogy of "the maze" to facilitate women's involvement towards the awareness of the universal movements for breast self-examination. We use the materiality of the temporary tattoos to reduce the self-imposed barriers around touching one's body.

Figure 3. The *Tattas* kit. A self-exam guiding product with three temporary tattoos, each with a universal movement pattern of self-examination, accompanied by two sets of guiding cards, one on how to perform the self-examination and another on how to identify physical and visual signals of breast cancer.

The kit

The *Tattas* Kit includes three temporary tattoos and a set of guiding and caution cards designed to be visually engaging and intuitive.

- **Tattoos**

Figure 4. The tattoos, each illustrating a universal breast self-examination pattern. From left to right: vertical and horizontal strips, concentric circles, and radial spokes.

There are three universal movements for breast self-examination: concentric circles from the breast's outermost point to the nipple, radial spokes from the perimeter toward the nipple, and vertical strips covering the entire breast, including the axilla area (Saunders, K. J. et al., 1986). *Tattas* provides three temporary tattoos to help women effectively learn these movements, each featuring one of the patterns and indicating the necessary pressure points.

- **Cards**

With support from mastologist Ignacio Castilla, we developed a set of cards using accessible and familiar language to make the information relatable and less intimidating regarding the self-exam process.

Figure 5. Visual overview of five guiding cards, offering (a) step-by-step visual instructions for temporary tattoo application, (b) graphic illustrations showing each examination pattern on the breast, and (c) detailed textual instructions on how to perform each pattern.

The guiding cards provide clear visual instructions for conducting a self-exam. They introduce the three universal patterns and outline five steps for applying tattoos.

Figure 6. Set of seven caution cards highlighting (a) key reminders when practicing the self-exam, such as monthly consistency and when to perform it; (b) a visual summary of general breast cancer indicators; and (c) detailed illustrations with descriptions of specific symptoms.

The caution cards explain ten warning signs of breast cancer, emphasising the importance of medical evaluation if symptoms persist. The cards clarify that experiencing these signs does not necessarily indicate breast cancer.

4.1. The workshops

The kit is the project's foundation, serving as a guide that empowers women's autonomy while workshops foster community. These spaces allowed us to prototype the kit and provide self-exam education, encouraging self-awareness and creating a safe space for discussion. The kit aims to open a moment for women to share their concerns, encourage collective knowledge-sharing, and let them know that they are not alone in their uncertainties about breast self-examination.

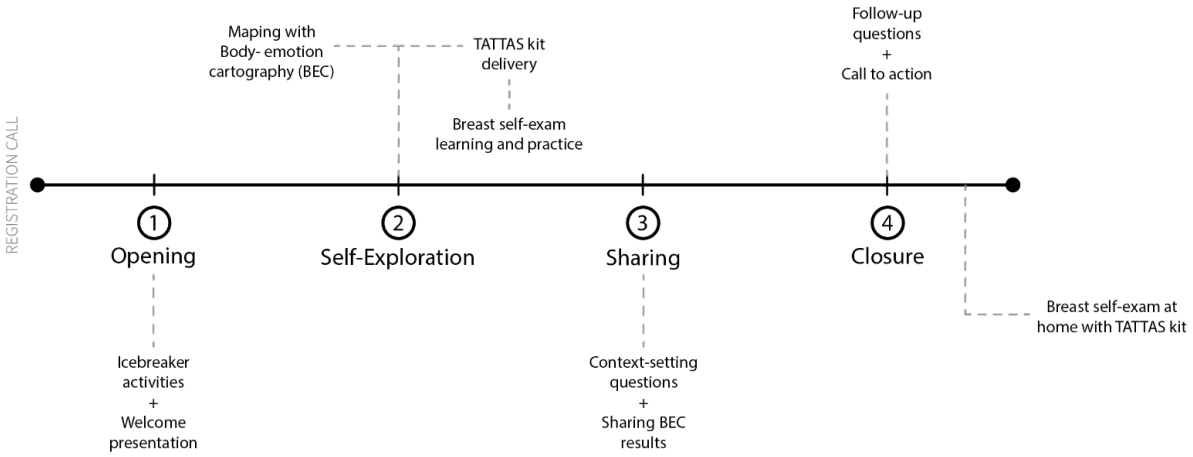


Figure 7. Diagram illustrating the structured methodology of the Tattas workshops, outlining the four key phases: (1) Opening, (2) Self-Exploration, (3) Sharing, and (4) Closure.

The workshop's methodology has four stages: Opening, Self-Exploration, Sharing, and Closure.

The **Opening stage** connects participants through discussions of self-care, health experiences, and breast self-examination. To encourage engagement, we apply icebreaker exercises such as rating their familiarity with self-examination on a 1-10 scale (Figure 8). Afterwards, we introduce the *Tattas* Project mission and the workshop expectations. By promoting trust from the first moment, we encourage active engagement among women.

The **Self-exploration stage** has two parts. The first part uses the BEC tool, encouraging participants to explore their bodies through emotions. It specifically focuses on participants' relationship with their bodies and how this connection influences the practice of breast self-examination. The second part uses the *Tattas* Kit to facilitate self-exploration of their bodies through self-examination. Some participants used the *Tattas* tattoos, while others focused on the information in the kit. During this phase, we review each kit component, ensuring that all elements are explained clearly.

The BEC tool consisted of three structured steps:

1. **Body Silhouette Drawing:**
   Participants are given a worksheet with an incomplete body sketch, where the head, arms, and feet are separated. This body allowed them to draw their silhouette freely, connecting the body parts and recognising the uniqueness of their bodies.

2. **Contextualization:**

Once the silhouette is defined, a scenario or question is introduced to contextualise the moment the person was mapping within their body.

3. **Mapping:**
   Depending on the session, participants follow predefined conventions or freely map emotions using colours, symbols, writing, or drawing.

The purpose of the **Sharing stage** is to create a space where participants take the lead, using their individual experiences to foster empathy. We ask context-setting questions about their self-exam practices, experiences, knowledge, and doubts. Participants also reflect on what they have learned through the BEC tool, recognising how their emotions and experiences are alike.

In the **Closure stage**, through follow-up questions, we aim to assess the project's strengths and areas for improvement. We asked the participants again, "On a scale from 1 to 10, how much do you know about self-exam?" to compare with their responses from the first stage. Each participant takes their *Tattas* kit home, and we end with a call to action, encouraging them to continue practising and applying what they have learned.

Cases

The *Tattas* Project was prototyped in two cases: Women in Business (WIB) and Medtronic. These prototypes aimed to gather feedback on the kit and workshop, understand their impact and innovatively raise awareness about breast self-examination.

Figure 8. Photographs documenting the implementation of the Tattas workshops in two different contexts: (Left) with Women in Business (WIB) community at Universidad de los Andes; and (Right) among women employees at Medtronic Colombia, highlighting engagement and practical application of the kit.

WIB is a student leadership community at Universidad de los Andes. The *Tattas* Kit and BEC tool were tested during Breast Cancer Awareness Day with 10 women between 18 and 23. The session began with context-setting questions on breast self-exams. Since the BEC tool was designed to be used in two stages, participants first created a map during the session and later a second one at home while practising with the *Tattas* Kit. The workshop ended with follow-up

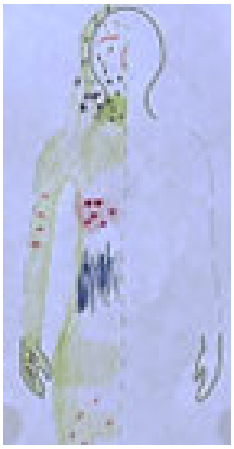
questions and encouragement to integrate self-exams into their routine.

Medtronic is a medical device company with an office in Colombia. Two workshops were conducted with 15 female employees, split into two groups. A Kahoot quiz on self-exam myths and facts served as an icebreaker, assessing knowledge and addressing doubts. In the self-exploration phase, private cubicles allowed participants to practice the self-exam using the *Tattas* Kit tattoos. They then mapped their feelings with the BEC. The session concluded with discussions and follow-up questions on learnings, gaps in information, and participants' overall experience.

4. Results

This section presents the findings from the WIB and Medtronic workshops, with 25 participants (10 from WIB, 15 from Medtronic). Analysis of key patterns led to four main categories, summarised in Table 1, organised by BEC tool number, case, image, and category. Below, we present four representative examples illustrating these results.

Table 1. Body-emotion cartography results

BEC #	Case	Image	Category	Quote/Words
1	WIB		Cultivating self-awareness.	"I have to learn to appreciate also my insecurities" **Conventions:** Dislike the most, like the most, less interaction, more interaction; you feel fear, you give it more importance, and you relate it to cancer.
2	MEDTRONIC		Loving makes me fear.	"What symptoms should worry me? At what moment at the beginning is it still possible to start a treatment?" **Conventions:** Impact, self-love, worrying.

3	WIB		From self-exploration to self-touch.	"I was not aware of my interaction with my legs; I seek to massage them; it is an area of my body that I feel comfortable touching. It would be interesting to work that comfort in other parts of my body." **Conventions:** Dislike the most, like the most, less interaction, more interaction, you feel fear, you give more importance to it, you relate it to cancer.
4	MEDTRONIC		Taking the leadership to make a call to action.	"I must be conscious of my health. Give priority and follow-up. It is simple and fast. Schedule it and do it!" **Conventions:** Curiosity, attention, emotion, novelty.

The findings from the BEC tool highlight key aspects of self-care agency:

- BEC 1 demonstrates how the tool cultivates self-awareness by helping participants recognise their insecurities and interactions with their bodies.
- BEC 2 reveals how the tool facilitates the expression of self-love and its connection to fear, allowing participants to reflect on what they are caring for and why.
- BEC 3 highlights that self-exploration is easier through self-touch, yet emphasises that touching the breasts is more challenging than other body parts due to the discomfort it may cause.
- BEC 4 shows how the tool helps to map learnings after performing the self-exam, empowering women to take leadership and issue a call to action for themselves and others.

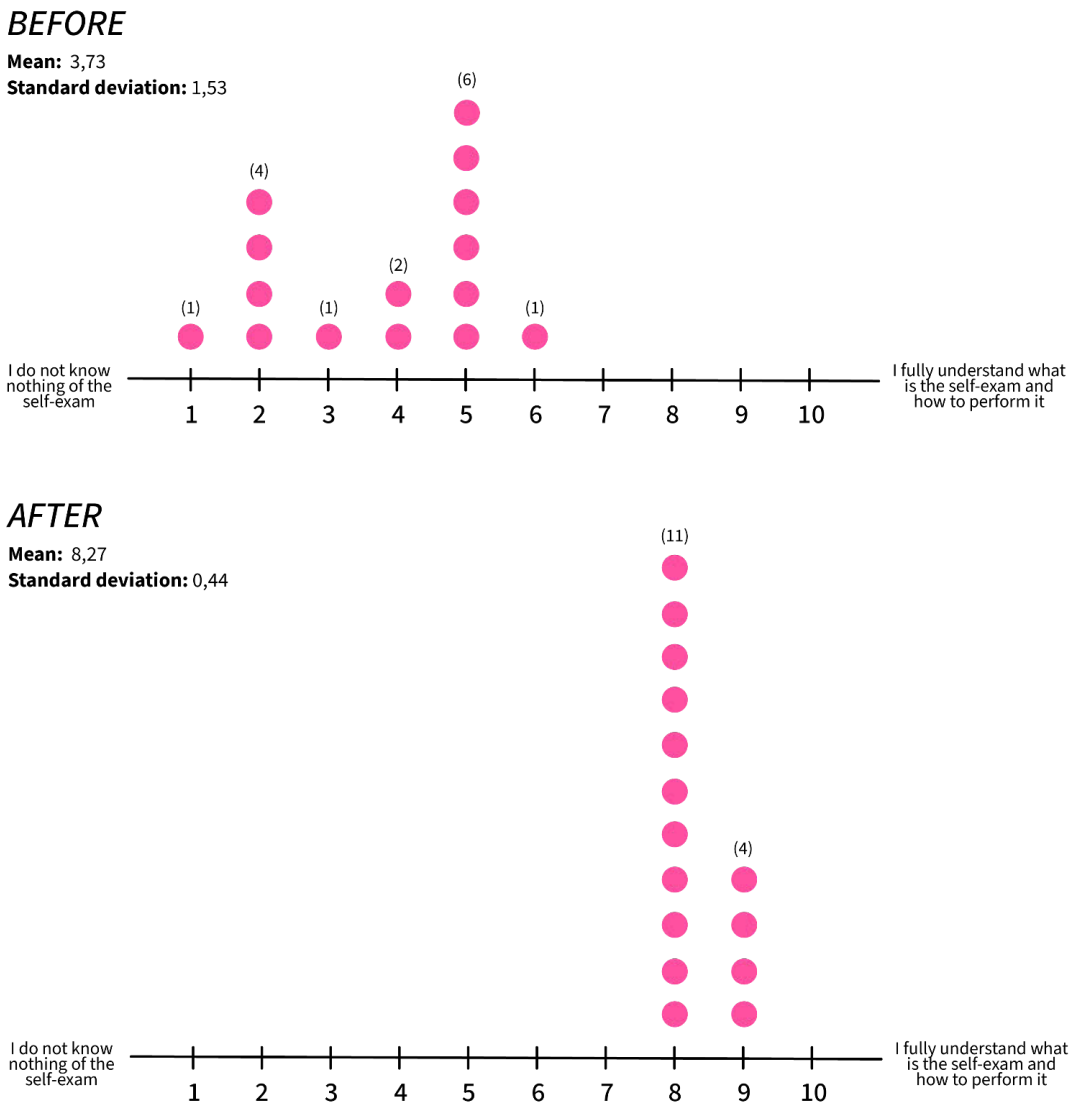


Figure 9. Comparison chart showing Medtronic participants' knowledge of breast self-examination before and after the Tattas workshop, illustrating a substantial increase in understanding

Figure 9 illustrates the knowledge levels of breast self-examination before and after participating in the workshop. Initially, the mean knowledge score was 3.73, with no participant scoring above 6. However, there was a noticeable shift after the workshop, with the mean rising to 8.27, with several participants reaching level 9, reflecting a substantial increase in understanding of breast self-examination.

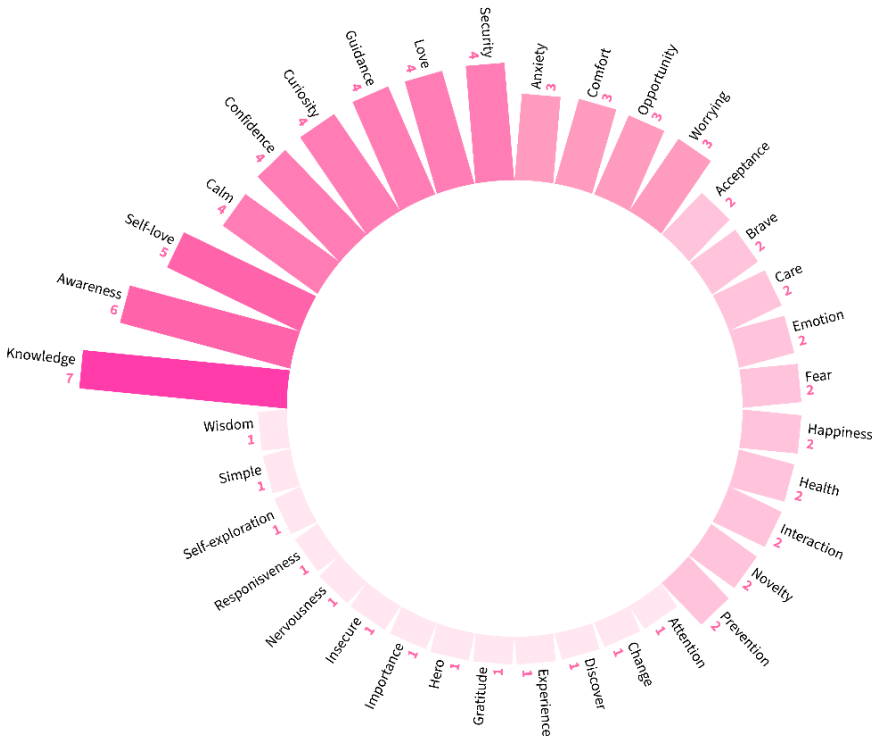


Figure 10. Frequency chart showing prominent words and emotions expressed by workshop participants, emphasizing key themes such as knowledge, awareness, and self-love.

Figure 10 illustrates the most frequent emotions and expressions that emerged during the application of the BEC tool and from responses to three collective survey questions: "In one word, how do you feel with the tattoo on?", "What did you learn today?" and "What additional topics would you like to learn about self-exam?". A qualitative analysis was conducted to examine these responses, drawing on 14 body-emotional cartographies and written survey answers collected during both workshops. As a result, this data identified and grouped the most prominent emotions and concepts based on their frequency and thematic connection, which are visually represented in this figure. Among the standout terms are "Knowledge" (7), "Awareness" (6), and "Self-love" (5), reflecting a strong emphasis on self-awareness and understanding. Additionally, other recurring themes include "Confidence," "Calm," "Guidance," "Love," and "Curiosity" (4).

Figure 11. Venn diagram illustrating the intersections between emotional outcomes and fundamental psychological needs (autonomy, beauty, security, and community) as addressed in the Tattas workshops, with knowledge positioned centrally as the core element.

The Venn diagram in Figure 11 maps the interplay between emotions, expressions, and the fundamental needs of autonomy, beauty, security, and community (Desmet & Fokkinga, 2020). These needs serve as lenses to understand how emotions connect with deeper motivational drives. Knowledge is at the centre of the diagram, acting as a catalyst that activates and interlinks all four needs.

In the quadrant of autonomy, words like change, curiosity, bravery, confidence, and self-exploration reflect how participants embraced the self-exam as an act of agency. The Tattas kit supports this by guiding the practice through clear, body-centred instructions that help transform initial fear into empowerment and self-awareness.

In the space of beauty, terms such as simplicity, coherence, and gratitude highlight how the novel aesthetics of the kit, particularly its unified design (a set of guiding and caution cards with a tattoo-based visual aid), promoted comfort and calm. This design helped women embrace both their natural beauty and the self-exam process. Beyond its functional role, the tattoo became a symbol of care and attentiveness toward one's body, reinforcing a positive and harmonious self-perception.

Within security, emotions like anxiety, fear, and nervousness reflect the uncertainty that often accompanies self-exams. However, their proximity to words like prevention and guidance reveals how structured knowledge can transform that uncertainty into reassurance. Understanding how to perform the self-exam empowers women, making prevention a proactive step rather than a source of worry. This approach is further reinforced through the workshops designed with a community-centred approach (safe, guided, and emotionally responsive spaces) where women receive support, ask questions, and build confidence through shared knowledge and experience.

5. Discussion and future directions

The results support the four dimensions of self-care agency (Kearney & Flesicher, 1979). As shown in Figure 12, these dimensions align with the *Tattas* methodology and objectives, empowering women to adopt breast self-exams and strengthen self-care agency. Below, we analyse their reflection on the project's outcomes.

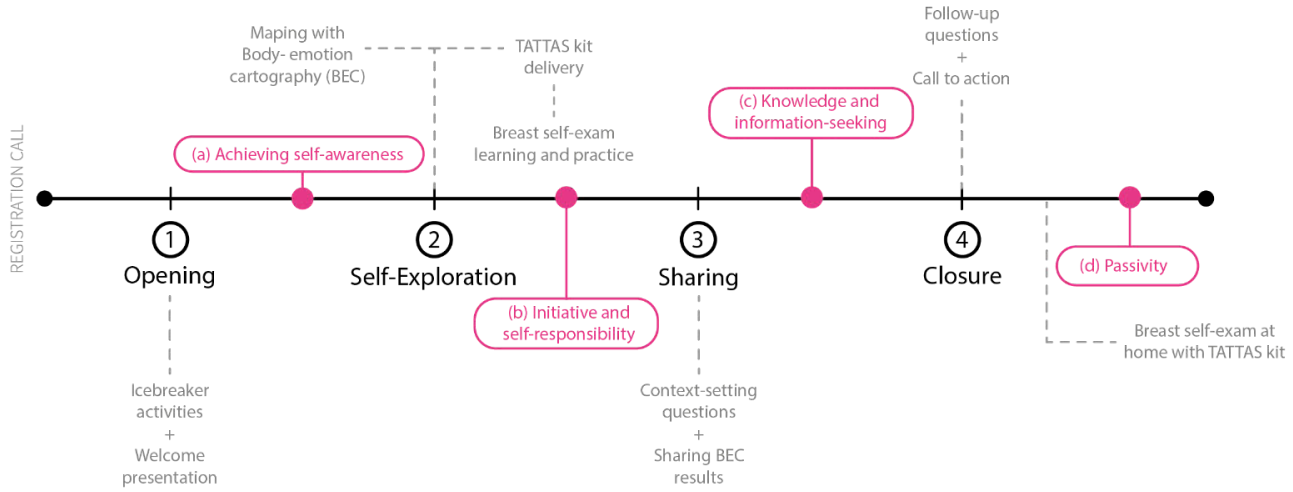


Figure 12. Diagram representing the four stages of self-care agency (self-awareness, initiative, knowledge-seeking, and passivity) integrated with the Tattas methodology.

Achieving self-awareness is the first step in developing the concept of self-care agency. This step is evident in the opening and self-exploration phases of the *Tattas* methodology, mainly through the BEC tool used in workshops. The BEC tool prompts reflection with questions like, "What do I like or dislike?" or "Which body parts do I interact with most?" Mapping these reflections fosters self-exploration beyond touch, strengthening emotional awareness of the body.

As shown in the results, participants shared insights such as, "I had never considered whether I interacted more or less with different body parts." These insights highlight how *Tattas* creates a space for self-awareness, helping participants recognise what they care for and why. Additionally, findings show that self-awareness reinforces emotional connections to the body and strengthens the sense of autonomy.

The second dimension, initiative and self-responsibility, emerges in the *Tattas* self-exploration phase, facilitated by the *Tattas* Kit. The kit's tattoos serve as visual guides, boosting confidence and comfort with practice. As shown in Figure 10, participants described their experience as one of "knowledge, awareness, and self-love", the key to taking responsibility for self-care. The project recognises the

duality of emotions: calm vs anxiety, confidence vs insecurity, comfort vs nervousness, and love vs fear, encouraging participants to embrace them as motivators rather than barriers. This paradox emphasises the importance of providing tools that empower participants to take the first step in self-care while navigating emotional challenges. Knowledge sustains self-care agency. Participants ask questions and express fears in the sharing phase, fostering trust and collective growth. Their curiosity about self-exams, prevention, and healthy habits reflects engagement.

Passivity, in the context of our research, refers to an inertial behaviour where the self-exam transitions from being perceived as an obligation to becoming a natural habit embedded in the participant's routine. This dimension of self-care agency aligns with the closure phase in the *Tattas* methodology, aiming to create a sustainable self-care practice. The *Tattas* project addresses this by providing a portable kit that participants can take home, enabling them to integrate the self-exam into their monthly routine. Workshops encourage participants to stay motivated and use the kit as a support tool. However, the project lacks a follow-up system to determine if self-exams become a lasting habit. This situation presents an opportunity to strengthen long-term engagement through community support.

While the early stages of self-exam adoption can be challenging, a supportive network could provide encouragement and continuity. If implemented in future project versions, women who establish self-exams as part of their routine could guide those just beginning, ensuring sustained knowledge and motivation. This potential evolution could help transform passivity into an ongoing self-care habit, reinforcing the *Tattas* project's long-term impact.

6. Conclusion

The *Tattas* project demonstrates that promoting breast self-examination as a self-care habit requires more than just sharing medical knowledge. It requires an approach that fosters self-care agency through self-awareness, initiative, knowledge-seeking, and habit formation. Our findings underscore the importance of empowering individuals to take an active role in their health while recognising that medical professionals remain essential in guiding and validating health practices. Designers do not replace the role of healthcare professionals. However, they offer alternative perspectives that enhance healthcare experiences, facilitate access to information, and transform self-care into a proactive and community-driven practice.

The *Tattas* project has the potential to become a leading example in health education by promoting autonomy and strengthening community engagement. By integrating design methodologies into healthcare, we can create solutions prioritising accessibility, inclusivity, and personal empowerment. *Tattas* exemplifies how self-care agency can be cultivated and encourages individuals to take responsibility for their well-being. This approach balances medical expertise with the understanding that self-care extends beyond doctor visits.

Tattas stresses that information is a powerful tool in challenging cultural taboos surrounding self-exploration. However, knowledge is not only acquired through information; it also needs a call to action through curiosity, questioning, and reflection to foster a deeper connection with one's body. While the initial stages of self-exploration may evoke discomfort, we identify that these emotions are

part of the learning process. The project does not aim to eliminate discomfort but to transform it into shared experiences that build resilience and collective knowledge. Community-based learning, where individuals share experiences and insights, reinforces the idea that no one navigates this journey alone. Looking ahead, we aim to create a supportive network that strengthens knowledge transmission and encourages sustained engagement with self-care practices. While community formation occurs during workshops, we seek to ensure it is long-term.

Furthermore, cultural and socioeconomic contexts play a significant role in shaping self-care behaviours. Moving forward, we plan to expand the project's reach to address geographical and economic barriers while understanding how access to healthcare creates new challenges for adopting self-examination practices, ensuring that self-care agency is accessible to all. By embracing a holistic approach, we envision *Tattas* as an ongoing movement that inspires self-care agency, curiosity, and collective well-being.

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PAPER SESSIONS WORKING

CARE AND PUBLIC INNOVATIVE ACTION ISSUES
Managing new ethics of public design

THE WORLD AS SEEN FROM THE WORKSHOP PERSPECTIVE. ON THE DILEMMAS OF TEACHING ETHICAL DESIGN.

AUTHORS

Jakub Karpoluk
Sabina Twardowska
Anna Eichler

JUNE 3-7, 2025

ABSTRACT | Graphic design and media carry social responsibility and can and should improve the world and global society. Therefore, graphic designers can play pivotal role with their ethical choices and finding solutions in complex transdisciplinary areas. Teaching designer's ethical attitude is crucial. This paper presents PJAIT strategies of teaching at the very early stages of students' education in their relationship to the ethical dimension of public design. The main subject of our analysis is the workshop program established at PJAIT. The Social Design Course, which started at PJAIT New Media Art Department in 2014, focuses on current critical social issues and emphasises the importance of first-hand and secondary research in creating wise and insightful content. Over the past 10 years, different issues have been the focus. The titles of the workshops explain the problems quite well: Refugees Crisis in Europe (2015), State of Democracy (2016), 100xIndependence (2017), Who is working? (2018), Fashion is my -ism (2019), If – Social Design for Sustainable Cities (2020), Truth Hurts – Lies Kill (2021), Belonging (2022), Identity in Crisis (2023) and Young Forever? (2024).

On the one hand, the workshops for BA and MA students teach the design process and skills, and touch upon an ethical approach to matters, f. ex. on the border of the digital and the physical world like *Truth Hurts, Lies Kill,* which focused on raising awareness of digital dangers. Other workshops PJAIT offers, go further into the world, like *U(A)rban Topologies* which was dedicated to the design of augmented reality applications in an urban environment. During the workshops that have taken place so far in several European cities - Warsaw, St. Pölten, Setúbal and Athens - priority was given to informative content taking into account the interests of local communities. Digital technologies, including AR, can be used to enhance the transmission of local cultures and can be characterised by an ethical approach to both the material cultural heritage and the current situation of a given local community. They can also engage audiences, enhancing educational processes and reinforcing contextual understanding as presented in the results of PJAIT workshop in collaboration with Manggha Museum of Japanese Art and Technology in Cracow – a project focusing on museum narratives.

These workshops strengthen students' awareness of their surroundings and disparity between the real and digital world, building their capacity for reflective and critical

approach in design. However, the workshops mentioned above address only a part of current social issues. This raises the question of whether academic programs can genuinely prepare students to solve social problems and instil an ethical design approach. Therefore, the relevant topic of the presentation is the ethical dimension of academic curricula in the design field.

KEYWORDS | SOCIAL DESIGN, SOCIAL ISSUES, WORKSHOPS, ETHICAL DESIGN, URBAN TOPOLOGIES

In our understanding, graphic design and various media carry social responsibility and can and should improve the world and global society. The human factor is crucial – an educated designer plays a pivotal role in identifying and responding to social and environmental needs. This designer is aware of their power to make a difference through their choices, strives to make ethical decisions, and can find solutions in complex transdisciplinary areas. Teaching this designer's attitude is not just crucial, it's empowering. With the proliferation of digital tools, students of design departments may quickly skim the surface of knowledge, but the critical approaches they learn genuinely empower them to act ethically. BA students at PJAIT come from different backgrounds, nationalities, and education systems. Some of them are as young as 17 years old. In order to guide BA students to the point of taking the designers' role in participatory projects, one must pave the way that will equip them with necessary knowledge, competences, and social skills. This is a process that takes time; therefore, it is paramount to start it early during studies.

The Social Design Course (SDC) at PJAIT Graphic Design and Multimedia Art is the first thing students experience when their first year of education begins, and every year they partake in a more advanced level of these 2-week workshops. Every year the socially urgent topic selected by SDC's initiator and main curator, Prof. Emerita Marjatta Itkonen (Aalto University), changes, but the structure of SDC eventually crystalized into the following form: all students receive a set (10-15) of articles before the workshop starts, all students attend lectures presenting broad view of given social issue during the first week of the workshop, then during the workshop the 1st year students learn the ropes of first-hand and secondary research and the design process based on editorial illustration and animation to aforementioned articles, whereas 2nd and 3rd year students elect workshops based on their design interests (they choose from approximately 10 options), and finally, MA students and selected 3BA students, led by Prof. Itkonen, participate in the most advanced projects. SDC concludes in presentations of the results of all workshops to everyone.

SDC started in 2014 and over the past 10 years have been curated by Prof. Marjatta Itkonen, Prof. Ewa Satalecka – Dean of PJAIT New Media Art, Prof. Jan Piechota with different issues in focus: *Refugees Crisis in Europe* (2015), *State of Democracy* (2016), *100xIndependence* (2017) – investigating the concept of 'independence' and connected to the celebration of Poland's 100 years of independence in 2018, *Who is working?* (2018) – on present and future jobs – a workshop with significant field research component including for the 1st year students, *Fashion is my -ism* (2019) – on fashion industry, fashion habits and circular economy, *If – Social Design for Sustainable Cities* (2020) – the international workshops and conference organized by EUNIC Warsaw and PJAIT with 30 partner schools from all continents, *Truth Hurts – Lies Kill* (2021) – on fake news and dangers of misinformation, *Belonging* (2022) – analysing the concept of 'belonging' in personal and planetary context, *Identity Crisis* (2023) – identity and identity politics in digital revolution, and *Young Forever?* (2024) – aging society. The topic in 2025 will be *Consumer Trap*. The programme for 1BA students based on Yadzia Williams' (Wrexham University) illustration programme is curated at PJAIT by Anna Eichler.

That strong introduction to the process of studies and to every academic year sets the tone to the students' learning process, raises their awareness and influences their way of thinking also in regular classes, as shown for example during other workshops like *U(A)rban Topologies* (dedicated to the design of augmented reality applications in an urban environment) or in the approach to a diploma theme. The fact that students of all years participate in the workshops and present various results on the same topic, and that a single workshop may include students on different level (2BA-2MA), creates a powerful peer-learning situation.

1BA students learn the design process with special emphasis on first-hand and secondary research, as well as the ethical concerns of using references or building mood boards. Following Lucy Alexander and Timothy Meara, the design process is presented as nonlinear and open for modifications.

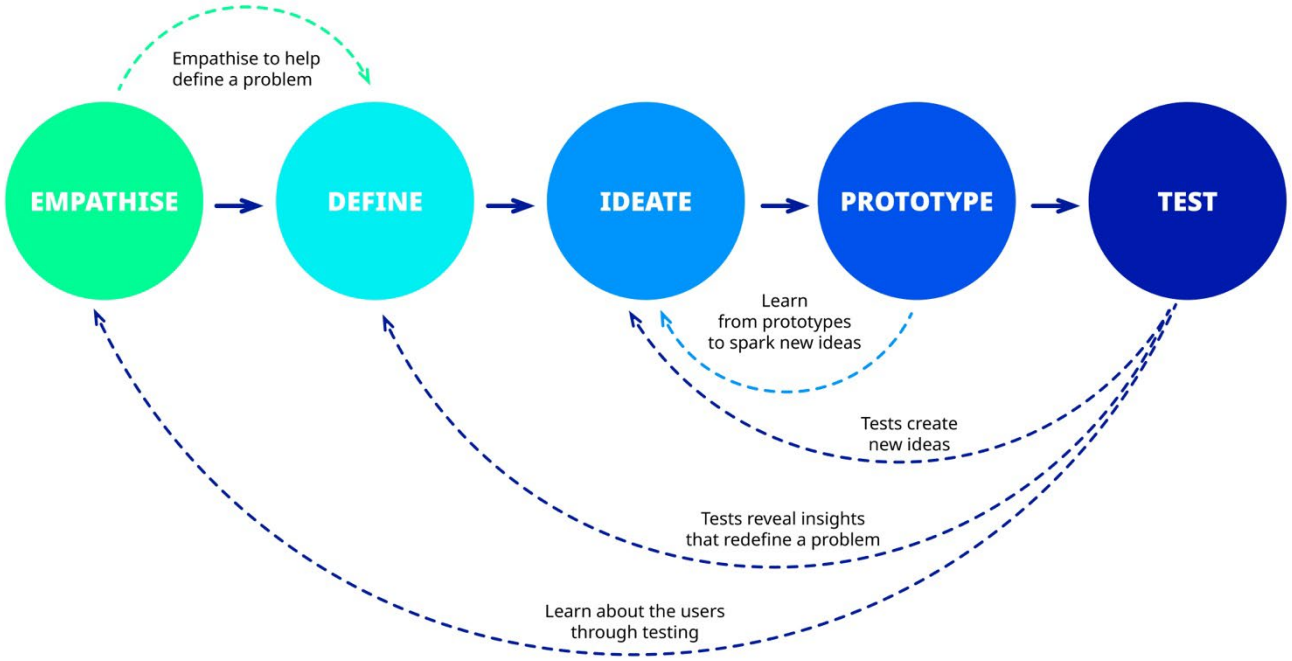


Illustration 1. Design process - the basics.
Alexander, L., Meara T., Central Saint Martins (2019), *Central Saint Martins Foundation: Key lessons in art and design*. Hachette UK

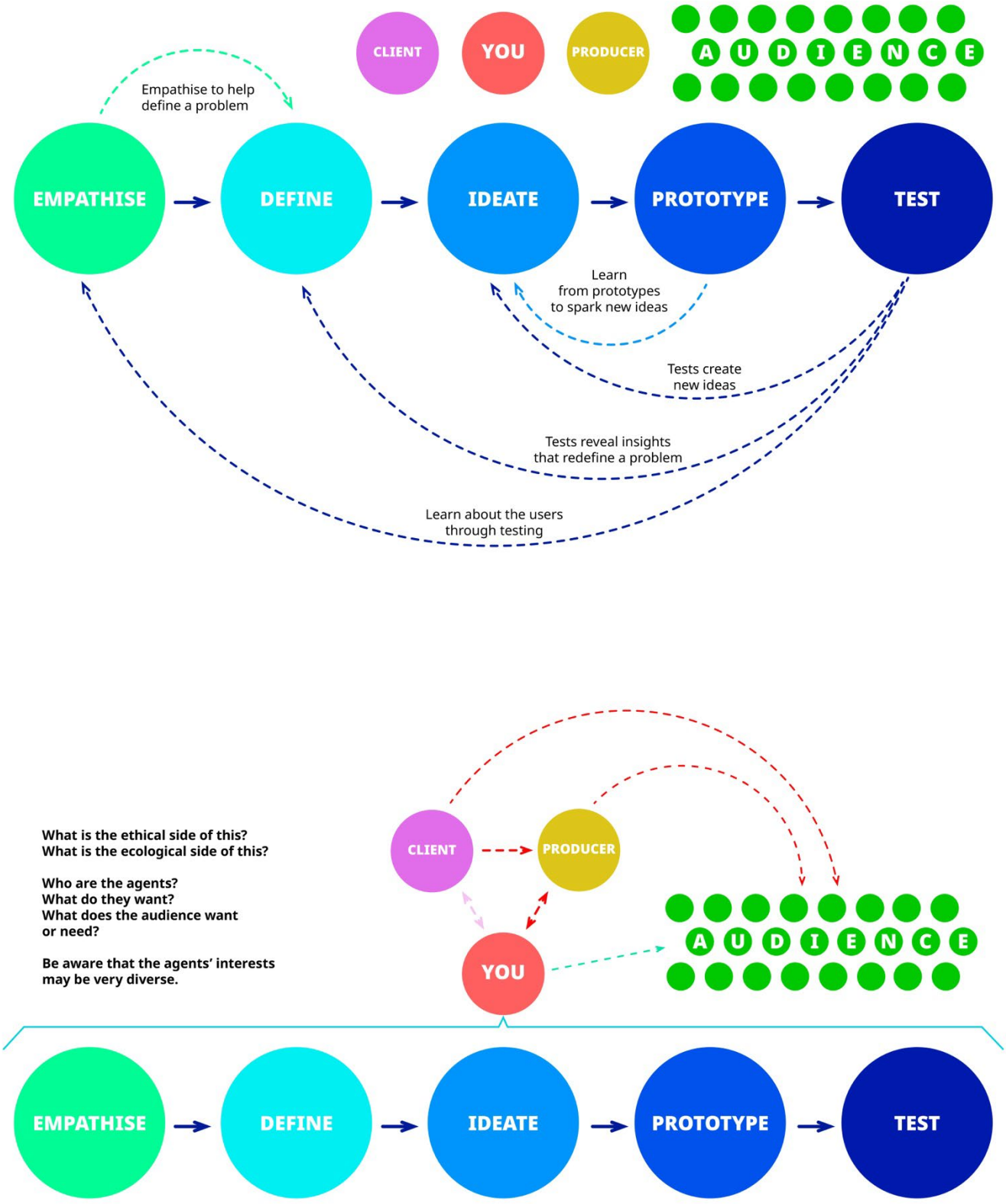


Illustration 2-3. Complexity of stakeholders relations in the design process, graph from presentation for 1BA students.

We have chosen the following 1BA SDC workshops as case studies:

BELONGING

In 2022, the leading theme of the social design workshops was ecological issues and belonging to each other and to the planet with a motto from John Donne 'No Man is an Island'.

In October, 1BA students were divided in teams and chose articles:

- *Missing Your People: Why Belonging Is So Important and How To Create It* by Tracy Brower, Forbes
- *Pesticide widely used in US particularly harmful to bees, study finds* by Lauren Aratani, The Guardian
- *The Importance of Developing a Sense of Belonging* by Sally Boardman, Lifeskills Group
- *We Were Born to Be Wild* by Margaret Renkl, New York Times

They attended the lectures of Minna Pyykkö (environmental journalist and artist, Finland), Karolina Rychter (philosopher and journalist, PhD), Kenji Kondo (Design and Creative Center Kobe, Japan), Krzysztof Cibor (Greenpeace Polska), Jason Grant (Inkahoots Design, Australia) and Maja Kleczewska (theatre director, Poland). Special guest speakers in the 2nd week were Bartłomiej Sabela (journalist reporting on Great Green Wall in Sahel) and Constance Guisset (designer). Under the supervision of visual storytellers Yadzia Williams, Sabina Twardowska, Anna Eichler and Sebastian Trzoska, they created an editorial illustration on a spread in given layout. The workshops continued in November, when the storytellers were joined by professional animators - Babis Alexiadis and Alicja Adamska, who guided the students to adapt their illustrations into short animations.

STANDOUT WORKS

WE WERE BORN TO BE
WILD
For we belong to one another — to the house finches and the climbing raccoons and the door-knocking turtles and the bathing bears. Recognizing that kinship will do more than keep our fellow creatures safer.

MISSING
YOUR PEOPLE
WHY BELONGING IS SO IMPORTANT
AND HOW TO CREATE IT
The pandemic has played havoc with our mental health, and a significant factor in our malaise is that we're missing our people—terribly. We long for friends, family and colleagues.

Illustrations 4-8. Examples of editorial illustrations made during BELONGING workshop in 2022.

IDENTITY CRISIS

Within the 2023 topic, the students looked at the following questions:

- Why is the younger generation so involved in this issue?
- Identity politics – is it detrimental to democracy?
- Identity politics and minority rights (immigration, sexual orientation, skin colour, religion) in the context of the politics and visual languages of Western and Eastern EU countries.
- National identity and propaganda.

They chose the following articles:

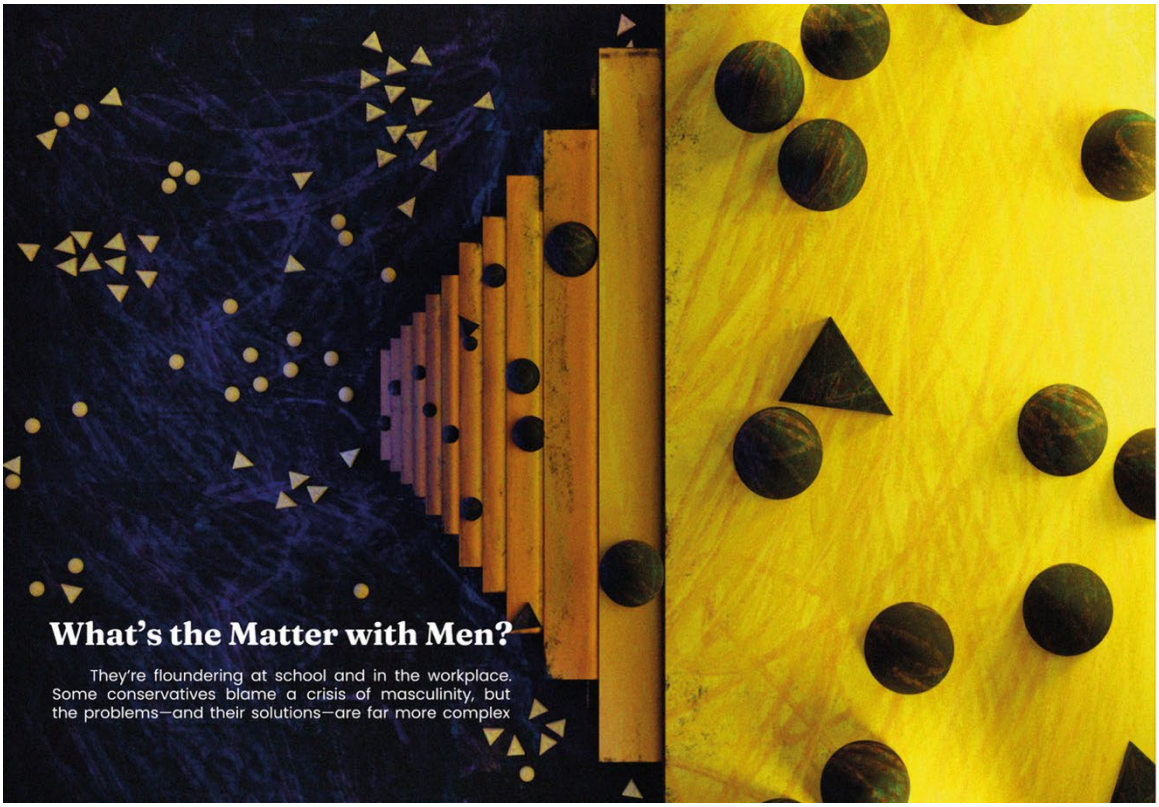
- *National identity is fake. We should focus on the wider common good* by Carlo Rovelli, The Guardian
- *Am I rootless, or am I free? 'Third culture kids' like me make it up as we go along* by Ndéla Faye, The Guardian
- *What's the Matter with Men?* by Idrees Kahloon, New Yorker
- *Online identity*: *Can we really be whoever we want to be?* by Aleks Krotoski, The Guardian

The students attended lectures by: Naomi Bueno de Mesquita (Design for Inclusion), Zuzanna Popławska (Centre for Migration Research), Kasper Strömman (Finnish graphic designer and influencer), Damian Flisak (lawyer and expert in law regulations concerning latest technologies, PhD), Beata Czajkowska (expert in governance and politics, PhD), Ingrid Van der Wacht (Factor-I, facilitator and communication specialist), Karolina Rychter (philosopher and journalist, PhD), Prof. Rebecca Duclos (Concordia University, Canada) & David Ross (ELIA UAx – report from visit in Ukraine), Piotr Niedziałkowski (medicine and allergology, MD), Paweł Pokutycki & Sonia Górecka (interaction designer and multimedia artist focusing on identity of digital). This time the voice was also given to graduates Ngoc Tran, Alesia Kuzmenkova, Aleksandra Mosina, Elina Pyrohova, Anastasiia Babii and Dieu Nguyen, whose diploma projects related to their own experiences of ethnical or national identity, the feeling of exclusion, longing for the homeland or the experience of war.
The illustration workshops for first-year students were led by Yadzia Williams, Ann Bessemans & Johan Vandebosch, KaMochi, Anna Eichler, Sabina Twardowska and Sebastian Trzoska. November animation process was supervised by Babis Alexiadis, Edyta Adamczak, Alicja Adamska, Ala Nunu and Magdalena Bryll.

STANDOUT WORKS AND QR CODES WITH SHORT ANIMATIONS (below)

Are you phubbing me?
Social media vs. mental health
Scientists are taking an ongoing look at the global experiment in which, whether we like it or not, we all take part. There is a lot of research on the impact of social media on our mental well-being

REC
Online identity: Can we really be whoever we want to be?
One of the net's original evangelists says that our experience of the web is changing our identity both on and offline



Illustrations 9-12. Examples of editorial illustrations made during IDENTITY CRISIS workshop in 2023.

The latest workshop (2024) touched on the issue of the ageing European society and was titled **YOUNG FOREVER?** The starting point was the encounter with statistical data, which says that by the year of 2100, one in three Europeans will be over the age of 65.

Students tried to answer the questions below:

- What about well-being, social networks, employment, and economic situation of the ageing population in Europe?
- Do elderly people have family and friends, or do they feel lonely?
- Does age racism exist?

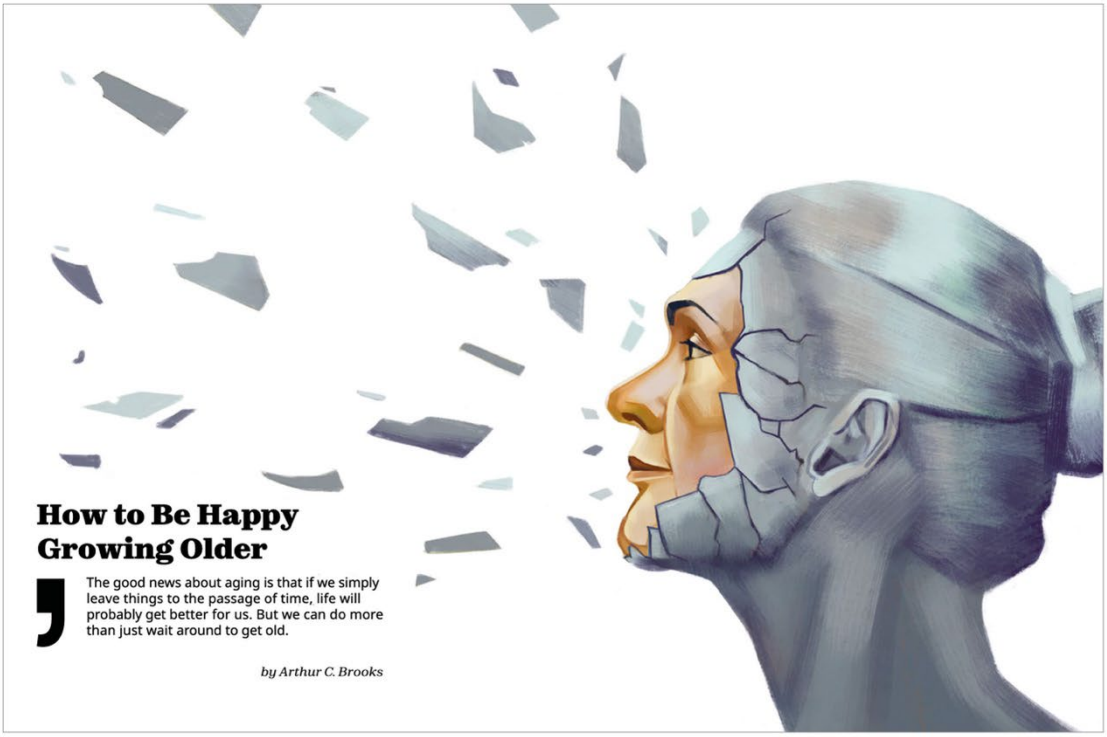
They chose the following articles:

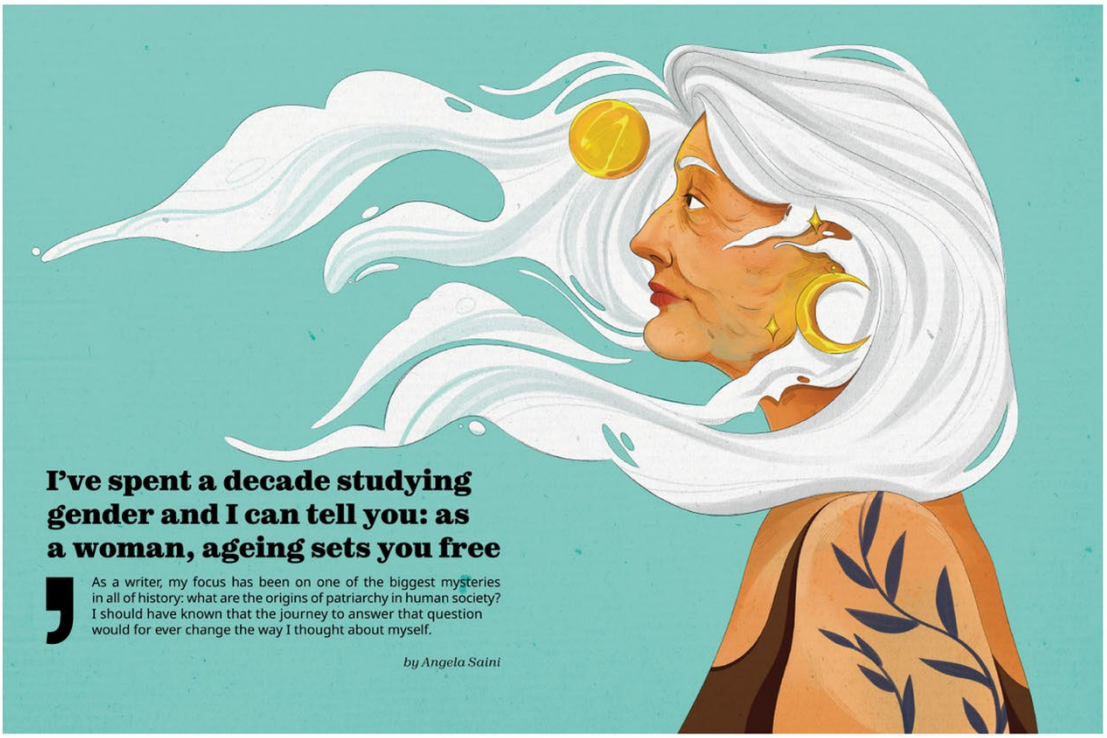
- *I've spent a decade studying gender and I can tell you: as a woman, ageing sets you free* by Angela Saini, The Guardian
- *Making Ageing Positive* by Linda P. Fried, The Atlantic
- *The Way You Think About Aging Affects Your Well-Being, Self-Esteem and How Long You Live* by Bonnie Marcus, Forbes
- *Old and Young, Talking Again* by Paula Span, New York Times
- *How to Be Happy Growing Older* by Artur C. Brooks, The Atlantic

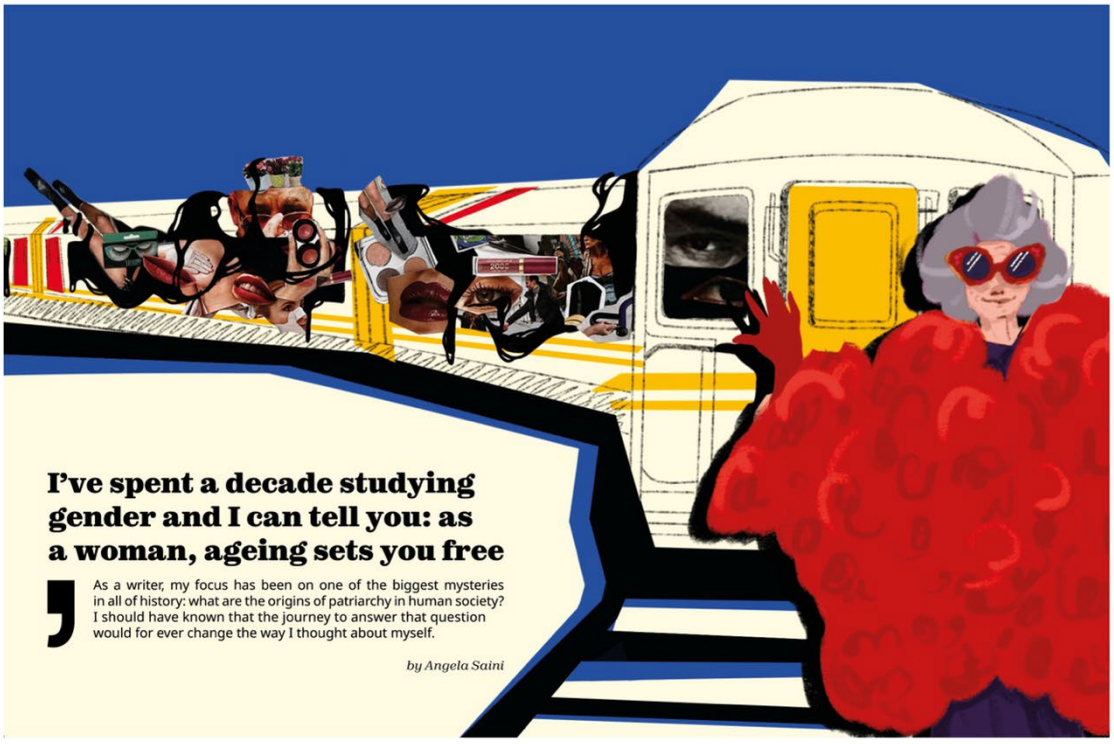
The following speakers discussed the issues of an ageing society from different perspectives: Gregor Strutz (designer - inkl.Design, Berlin), Zofia Szweda (Doctor of Economics, Poland), Marta Wierusz (architect, Poland), Aleksandra Warecka (reporter specialising in social issues, Poland), Kristel Auero (Population Research Institute, Väestöliitto, Finland), Kuba Szczęsny (architect, Poland), Kajetan Gołębiewski (expert in cultural studies, Dom w Alejach, Poland), Beata Czajkowska (expert in governance and politics, PhD), Mateusz Szewczyk (designer, DFA) and Radosław Siedliński (philosopher, PhD).
The students were supported by illustrators (Ka Mochi, Sabina Twardowska, Anna Eichler, Marta Marszałek, Yadzia Williams and Susanna Cerri), as well as animators (Babis Alexiadis, Ala Nunu, Weronika Szyma, Magdalena Bryll and Edyta Adamczak).

The Social Design Course for 1BA broadens students' horizons and equips them with basic designer tools, it serves as an introduction to more complex workshops with socially engaged topics like the following example of *U(A)rban Topologies*.
Each passing year proves that the encounter with a socially and ethically engaged design of students – future designers of different fields –should occur as early as possible in their learning process. Starting with a program that allows 1BA students much freedom in the aesthetical approach, which introduces the basic tools to explore critical issues, leads to their future projects or diplomas that are not only visually attractive but, above all, deep, important for the world, based on real, reliably collected data - projects that have the potential to initiate a change for the better.

STANDOUT WORKS AND QR CODES WITH SHORT ANIMATIONS




I've spent a decade studying gender and I can tell you: as a woman, ageing sets you free
As a writer, my focus has been on one of the biggest mysteries in all of history: what are the origins of patriarchy in human society? I should have known that the journey to answer that question would for ever change the way I thought about myself.
by Angela Saini


I've spent a decade studying gender and I can tell you: as a woman, ageing sets you free
As a writer, my focus has been on one of the biggest mysteries in all of history: what are the origins of patriarchy in human society? I should have known that the journey to answer that question would for ever change the way I thought about myself.
by Angela Saini

Illustrations 13-18. Examples of editorial illustrations made during YOUNG FOREVER? workshop in 2024.

TOWARDS ANTHROPOLOGY OF AR

Augmented Reality (AR) is an enhanced interactive version of the real environment created using digital visual elements, sounds and other sensory stimuli via holographic technology. Still a good definition of the nature of mixed reality of which a variation is augmented reality is that proposed by Paul Milgram and Fumio Kishino. Scientists defined MR, AR and VR as "related technologies that involve merging real and virtual worlds somewhere along the 'virtuality continuum' which connects authentic environments to completely virtual ones." [1] There is a mutual influence between information technologies, the design industry and the cyborgization social process. The latter stands behind, the development of, among others, AR technology, which can expand the user's field of information within everyday life and has artistic applications. Most popular contemporary human extension, enabling AR applications, is no doubt a smartphone or a tablet. Designers and social scientists can positively influence the development of the mixed reality phenomenon by, among other things, orienting the associated technologies and the content presented to present the cultural heritage of different societies in a spirit of cultural relativism.

All the places inhabited by humans are meaningful. Yi-Fu Tuan suggests that a place is distinct from other spaces, existing as an anchor of personal emotional attachment and involvement, where humans "pause" in an otherwise highly mobile existence.[2] A place is what brings meaning to human lives. A place is intimate and AR design benefits from recognising the multiplicity of that meaning. Using this lens of place requires prioritising lived experiences, working in what spatial theorist Edward Soja called the register of "lived space".[3] Different places have their meanings, they are intimate for some of the inhabitants, AR designer is to some extant able to make these meanings (culturally defined) visible, to as many of social actors as possible.

PJATK has some experience in the creation of MR applications including augmented reality. Currently, the university is co-creating an educational programme, based on Erasmus BIP funds, *Roots of Digital Future*, in collaboration with the Polytechnic Institute of Setúbal (Setúbal, Portugal), the University of West Attica (Athens, Greece) and St. Pölten University of Applied Sciences (St. Pölten, Austria). As part of the programme, educators have realised the *U(A)rban Topologies* AR project of an informative nature in urban environments (St. Pölten, Warsaw, Setúbal and Athens).

Regarding Yi-Fu Tuan's and Edward Soja's postulates of meaningful places and considering that these places have both past and future in April 2024, we have proposed a new AR content to the citizens of Setúbal city in Portugal. We were not exactly adding meaning to public places and monuments of Setúbal, using AR, but rather enhancing the local voices, making the socially negotiated meaning visible to all kinds of users, these who were members of local community and these who just happened to visit Setúbal for a limited period,

[1] Milgram, P., Kishino, F. (1994) A Taxonomy of Mixed Reality Visual Displays, in: "IEICE Transactions on Information and Systems", no. 12. Tokyo: The Institute of Electronics, Information and Communication Engineers, p. 1.
[2] Tuan, Y. (1977). Space and Place: The Perspective of Experience. Minneapolis: University of Minnesota Press, p. 6.
[3] Soja, E. W. (1996). Third space: Journeys to Los Angeles and Other Real-and-imagined Places. Hoboken" Blackwell Publishers Inc, p. 66.

like we and our students have. One of the applications titled *Fish m(AR)ket*, told the story of the Marcado do Livramento, important food market, inaugurated in 1876 and decorated with some 5700 *azulejos* tiles.

When AR developers digitally augment a location, they automatically connect with the communities inhabiting that space. However, that relationship is often unrecognised or underdeveloped. How people use a certain area should be important for the AR designer. We believe AR practices called 'tethering' and 'rooting' are more anthropologically sustainable practice of AR design.[4] Many AR experiences are limited in geographic scope, which sounds like a limitation but these applications enable meaning into places. They are tethered - tied to points in space. Tethered AR opens possibilities for site-specific experiences, for augmentations that build on where a user is and what they are seeing in a less definite way. Here the designer is augmenting a curated locations rather than the world as a whole. Not only local communities but also museums around the world are using augmented reality to enhance exhibits by overlaying digital content on top of physical artefacts. Recognising the museum potential of AR applications, in December 2024, we realised the AR Museum project in collaboration with the Manggha Museum of Japanese Art and Technology in Krakow. AR offers an interactive, educational experience, allowing visitors to see additional information, reconstructions, animations, etc. The technology engages audiences, enhancing educational processes and museum narratives and reinforcing contextual understanding of exhibits. The Ministry of Culture of the Republic of Poland fully funded the AR Museum project. Five applications or, in other words, five different AR 'experiences' have been created for the usable spaces and collections of the Manggha Museum. All work was carried out in a workshop system, between 9 and 13 December 2024. Here is the description of two of the resulting AR experiences.

The first of the applications, informative in nature, was titled *Wave* and deals with the already iconic buildings that make up the Manggha Museum. Most attention has been paid to the main building, designed by Japanese architect Arata Isozaki (1931-2022), shaped like a river wave. The user, using their smartphone, can recognise the museum's individual buildings from the text that appears next to the image. The user thus learns about the functions of the museum buildings and any contexts, including the history of how the museum came into being or the architectural concepts underpinning its form. The user is also provided with a film showing the building from a bird's eye view, which allows them to understand the Manggha Museum's place in Cracow's urban structure. The application can be used regardless of whether the museum is open or closed, and two language versions are available - Polish and English, which increases the number of potential users. Information about the museum is based on text and images, including architectural sketches.

The second application was entitled *In the Collector's Room*. It concerns the person of Feliks 'Manggha' Jasieński (1861-1929), an art critic and collector whose collection comprises almost 15,000 objects, the best known of which are the works of Japanese art that have been on display at the Manggha Museum for 30 years. To launch the application, the user must

[4] Fisher, J.A. (2021). Augmented and Mixed Reality for Communities. Abingdon: CRC Press. 2021. p. 90-92.

point the tablet's camera at the bust of Feliks Jasieński, located in the central part of the museum's hall. The user is shown screens presenting the collector's biography and information on the various categories of objects comprising the collection, including *ukiyo-e* woodblock prints and Buddhist sculptures. Scans of the objects appear before the viewer's eyes. The application is informative and based on text and three-dimensional images.

Given our experience of implementing AR applications in urban spaces and the museum, we believe this technology has a significant, positive dimension in a social sense. Of course, only if we as designers have social and educational interests at the centre of our activities and if we draw largely on the achievements of contemporary anthropological thought. AR even has anthropological research potential, and we intend to devote our next planned workshop to this idea.

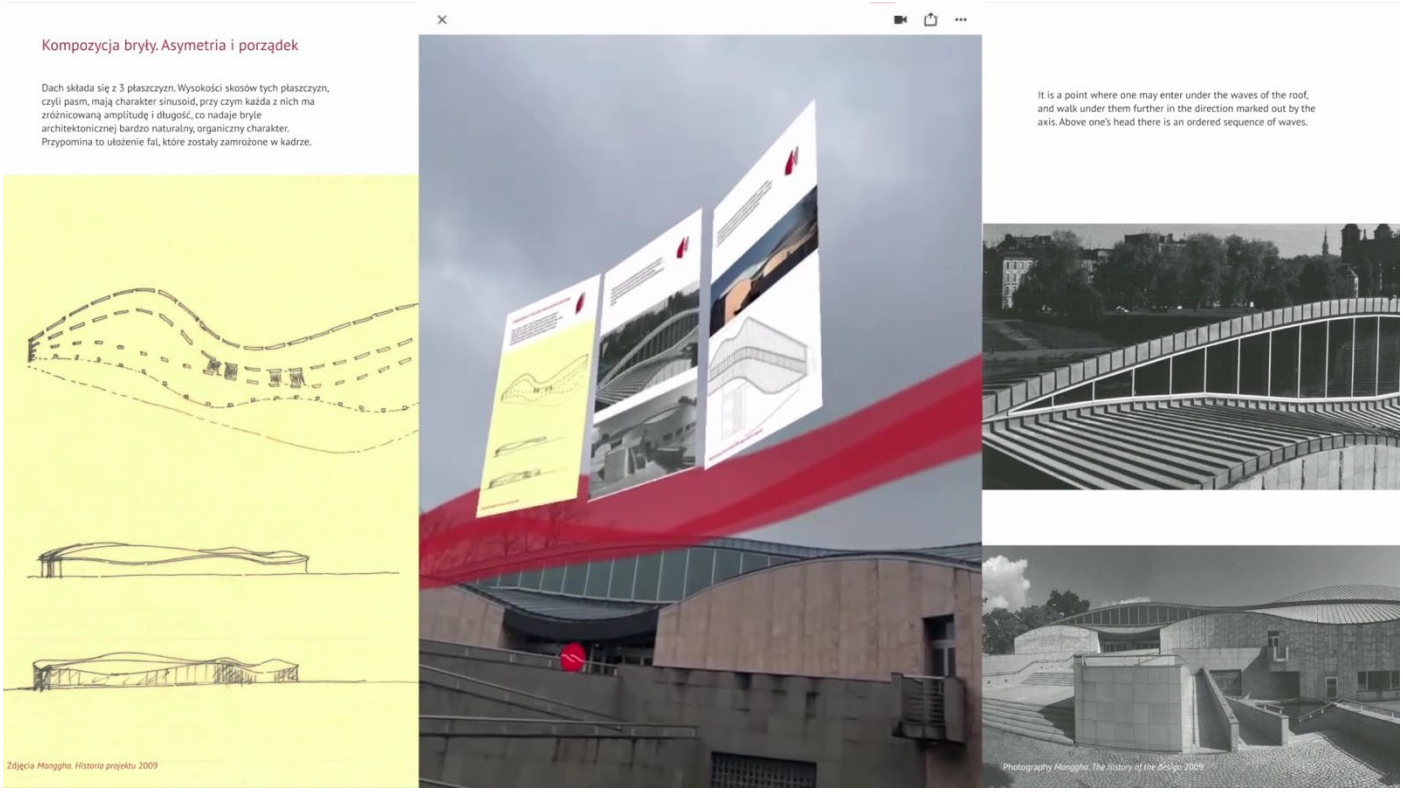
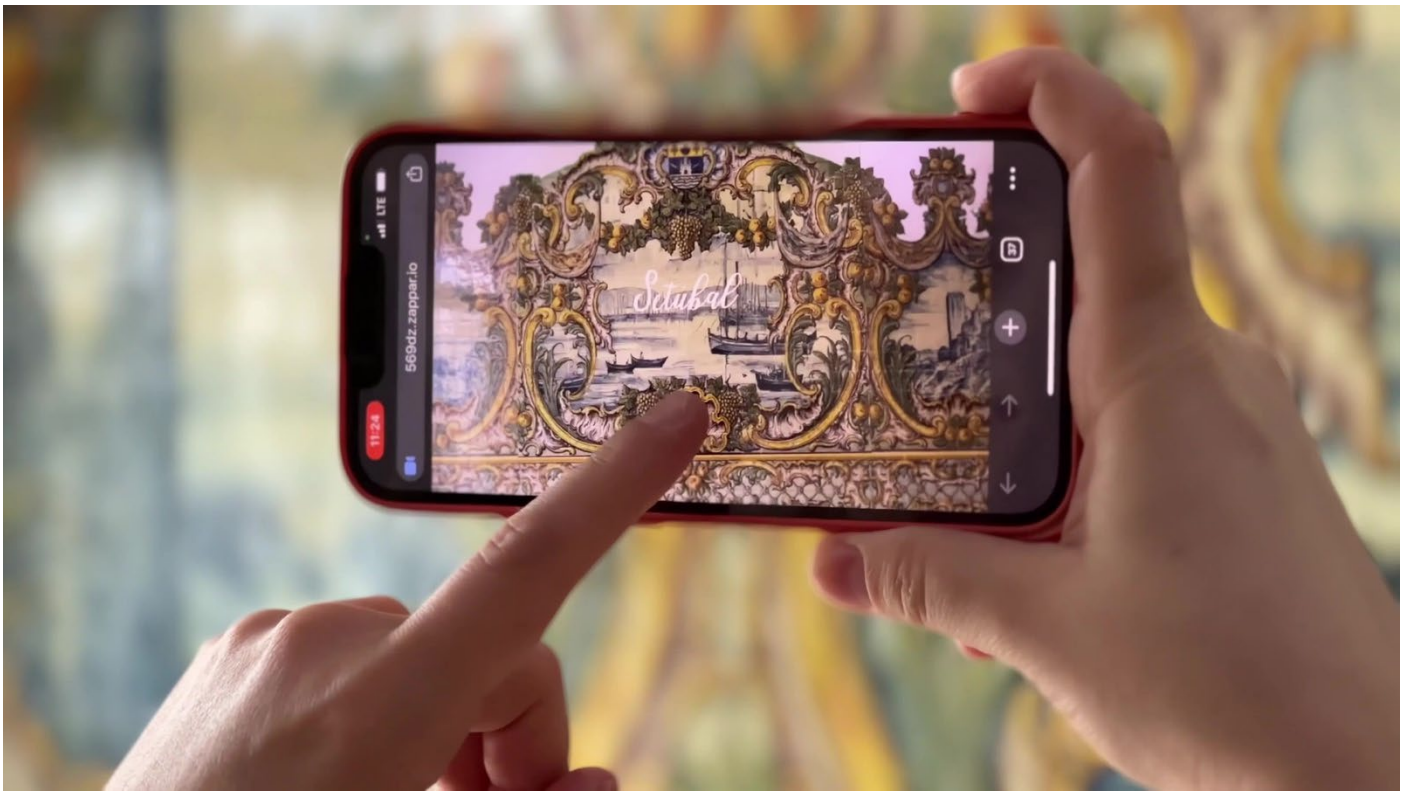


Illustration 19. AR experience *Wave* by Maja Celińska, Róża Czuba, Olga Siudaj, Sofia Bielienkova, PJATK & Manggha Museum of Japanese Art and Technology, Kraków 2024.

Photography 1. AR experience *In the Collector's Room* by Zofia Chętkowska, Julia Staszczyszyn, Julia Lewicka, Ola Al-Wohaishi, PJATK & Manggha Museum of Japanese Art and Technology, Kraków 2024.



Photography 2. AR experience *Fish m(AR)rket* by Zofia Chętkowska, Julia Staszczyszyn, Elina Sergieieva, Polytechnic University of Setúbal, Setúbal 2024.

Photography 3. AR Museum workshop at Manggha Museum of Japanese Art and Technology (PJATK MA students Zofia Chętkowska and Julia Staszczyszyn), Kraków, December 10, 2024.

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TOWARDS COMMUNITY-LED GOVERNANCE: DESIGNING EQUITABLE POLICIES FOR SOCIALLY RESPONSIBLE COMMUNITY EMPOWERMENT.

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ABSTRACT | This paper discusses the transition towards community-led governance supported by design approaches in new public governance, helping to define an agenda on designing equitable policies for socially responsible community empowerment. It highlights the critical importance of identifying and addressing community capabilities and their limitations to deploy socially responsible design processes aiming at equitable policies and community leadership. Neglecting the limitations of communities' capabilities can lead to reckless community empowerment, which does not prevent precarious and risky situations for communities.
Despite the growing interest in design approaches to community engagement and empowerment in the context of policymaking and democracy (Bason, 2014; DiSalvo, 2022; Huybrechts et al., 2018; Sanoff, 2007), a socially responsible design approach to community empowerment in the new public governance still needs to be explored and defined further. This manuscript explores this by drawing on collaborative design research with Brazilian communities living in informal settlements during the COVID-19 pandemic. This research included multiple data sources. Primary data were collected at the beginning of the pandemic in Brazil through 3 online roundtables with community members and not-for-profit organisations' representatives who helped the communities mitigate the impacts of the disease. Mapping methods were utilised to make the lived experiences of communities visible, enabling to identify and analyse interrelated problems, challenges for communities, and adaptive strategies or solutions (mostly by communities).

Creative and collaborative design approaches could contribute meaningfully to anticipating and responding to complex 21st-century challenges (Junginger, 2014; Mortati et al., 2016), which cannot be solved by a single knowledge area and without effective engagement of citizens and key stakeholder groups. In policymaking, these design approaches and methods often aim at effective community and stakeholder groups' engagement and empowerment throughout new public management processes that share with or transfer to the public (e.g., citizens, non-governmental organisations, etc.) roles and responsibilities that were traditionally taken by the public sector, potentially moving towards community-led governance.
These design approaches have been gaining momentum in policymaking and implementation by supporting new public governance and responding to the austerity period's plummet in public budget spending (Julier, 2017). In this context, design plays a transformative role in conventional policymaking by helping to bridge the gap between policy development and implementation (Junginger, 2014) and supporting multidirectional learning between designers, various stakeholder groups and citizens across the span of design processes (Huybrechts et al., 2018). Community empowerment in these processes has been related to citizens' design literacy or skills (Dong, 2008; Manzini, 2015a, 2025b, 2019) also as a form of resistance (Viana & Loschavio dos Santos, 2020; Seldin, 2024).
However, design approaches to community engagement and empowerment in new public governance have not often considered their limitations, drawbacks and effects on communities. Furthermore, they are grounded in Global North studies, missing contributions from the Global South that could have a transformative and political role in addressing these public challenges (e.g., Freire, 1970, 1976). Insights into community leadership and its limitations are still necessary to develop socially responsible design approaches to equitable policy development in the transition towards community-led governance.

KEYWORDS | EQUITABLE POLICIES, SOCIALLY RESPONSIBLE DESIGN, COMMUNITY-LED GOVERNANCE, COMMUNITY LEADERSHIP

1. Introduction

This paper draws on a collaborative pilot study conducted with communities living in informal settlements in Brazil when the COVID-19 pandemic was starting to reach the country in 2020. On the one hand, it addresses the need to consider their lived experiences, livelihood diversity and socioeconomic determinants to co-design public systems, policies and services that could help them protect their health. On the other hand, it identifies and analyses powerful community leadership that is emerging in these communities and could lead to a future of governance that is community-led. In this paper, I am particularly interested in defining a research agenda that is concerned with the socially responsible development of this future community-led governance supported by design research and practices.

In this research context, socially responsible design and designers' role could be key enablers of ethical leadership by helping to ensure responsible community empowerment in health and well-being and by communicating community lived experiences and needs in respectful, clear and accessible ways to different stakeholder groups that communities might not be able to access and affect their capabilities to protect their health and well-being as well as to cultivate their own ways of living a healthier life.

In this process towards ethical leadership, socially responsible design and designers could contribute to socially just decision-making by deploying collaborative, creative and analytical design skills for equitable public service and policy development that prioritises communities' needs, respects and addresses their livelihood and sociocultural diversity, considers their socioeconomic determinants, their capacity and its limitations.

Community is a term utilised to describe a group of people "living in one particular area or people who are considered as a unit because of their common interests, social group, or nationality" (Cambridge, n.d.). In this paper, a community refers to the people who live in the territories (informal settlements) which were the focus areas of the study. They share sociocultural practices and are affected by similar socioeconomic determinants. They also deal with the challenges of living in territories where often there is no proper and formal urban infrastructure. They have been using their social organisation and cohesion capacity to address deficiencies in public infrastructure, policies and services.

1.1. New public governance and design

The origin of participatory design methods is typically traced back to the 1960s regarding public decision-making processes in the USA, and systems development during the 1970s in Scandinavia (Sanders & Stappers, 2008; Sanoff, 2007). Participatory design and co-design capabilities relate to designers' traditional skill set that enables tools development (Sanders & Stappers, 2008), and to management methods utilised to facilitate visioning and strategic planning along with communities (Sanoff, 2007). Codesign is seen as the "collective creativity as it is applied across the whole span of a design process", is a specific instance of co-creation and refers to "the creativity of designers and people not trained in design working together in the development process" (Sanders & Stappers, 2008, p.6).

Julier (2017) explains that the trend towards different stakeholder groups and citizen engagement to solve public problems started in the 2000s and was particularly triggered by the austerity crisis. This networked or new public governance concept is based on the idea that citizens, public servants, and organisations could form networks or communities and the state would manage those networks, reinforcing interdependence of actors and

their shared goals. In this context, creative and collaborative design approaches and methods have been attracting attention in policymaking and the design capabilities of the public are stressed (Manzini, 2015b, 2019; Dong, 2008). Manzini (2015a, 2025b) classifies citizens' design capabilities as diffuse design capabilities, meaning the natural human ability to design based on creativity, critical and practical sense. The author suggests that these will be elementary capabilities of citizens in the future of public governance (Manzini, 2019). Similarly, Dong (2008) argues for the need to develop citizens' design capabilities to enable meaningful participation in public urban design and public work during recovery. In international development, Sen (1999) emphasises the critical role of "the effective use of participatory capabilities by the public" (p. 18) as well as the need for appropriate public policies to enable people "to live the kind of lives they value - and have reason to value" (p. 18). The latter is central to Sen's capability approach.

Another aspect that makes design approaches and methods relevant in policymaking innovation is that policy cycles are traditionally drawn from a problem-solving approach that separates policymaking from policy implementation, generating a mismatch between policy planning and implementation once policymakers are usually not familiar with citizens' problems (Junginger, 2014). Hence, a human-centred design approach helps to identify the causes of a public problem and could go beyond, contributing to building desirable futures, being future-oriented rather than reactive and responsive to existing problems (Junginger, 2014). Moreover, our 21st-century challenges are complex, systemic and interconnected, therefore they require design skills and experimentation typical of design approaches as public challenges faced by governments cannot be solved anymore through pre-set answers (Mortati et al., 2016).

Finally, design approaches in the public sector could help to protect and strengthen democracy through their participatory principles and methods. Huybrechts et al. (2018) highlight design processes as multidirectional learning processes. Throughout these processes, designers, diverse stakeholder groups and citizens learn together. They identify three clusters of capabilities in participatory design promoting the capacity to collectively visualize the different views on the matters of concern, to reflect together and to take collaborative action. DiSalvo (2022) recognises that design tends to be oriented towards the commitments of free-market capitalism that also have been influencing government and civil society, proposing design as "a mode of democratic inquiry into diverse civics" (p. 1) that could be a means of caring together for our collective futures.

The drawbacks of design approaches in the spaces of policymaking and of the public sector are related to conflict of interests, privileges of specific networks over others, their criteria for inclusion or exclusion of individuals, or, if the represented citizens can be considered representative of all citizens and public interest (Julier, 2017). Additionally, an emphasis on a vision that lacks implementation concerns and consideration of feasible and politically desirable outcomes and impacts makes these approaches questionable (Julier, 2017). Furthermore, this can be seen as "the relinquishment" of the state's responsibility for the welfare and other public services (Julier, 2017, p. 155).

1.2. Critical pedagogy and democracy in Brazil

Another criticism is that the literature concerning this topic is grounded in the Global North scholars' work and contexts. Although meaningful views and perspectives from the Global South were discussed and applied before towards equitable futures and contributing to democracy (see, for example Freire, 1970, 1976), they are still missing and underrepresented. In response to this issue, I have been collaboratively exploring and

defining the potential contribution of Freire's work (Freire, 1976) to the further development of socially responsible design approaches in an effort to integrate and apply this meaningful perspective and practice to socially responsible design research and practices that share their interest in the public good (see Fonseca Braga, M. C. van Amstel, & Perez, 2024).

Freire's critical pedagogy methods introduced the principle of mutual learning in the literacy context influencing democracy in Brazil. He changed people's lives through new ways of bringing literacy to illiterate adults in these communities, generating a massive impact on their capacity to read 'not only the words but the world'. His approach is recognised to be radical in breaking the hierarchies of learning practices and introducing equitable, bottom-up ways of 'teaching' that started to be understood as 'mutual learning', putting students as the most knowledgeable of their own lives in an equitable position in the learning process and immersing 'teachers' in the world of students, which was the starting point for their literacy learning processes. The mutual learning process is liberatory and grounded in reciprocity, transforming the educator and the educatee. This also influenced democracy in Brazil. In the 1960s, there was a law that prevented illiterate people from voting, and 40 per cent of the Brazilian population was illiterate. They must achieve a minimum literacy requirement to allow them to vote.

1.3. Research context

This paper's discussion is based on a prior pilot study conducted with Brazilian communities who live in informal settlements. This design research identified the needs, challenges for and strategies of these communities to protect their health during the beginning of the COVID-19 pandemic in 2020. Informal settlements are overcrowded territories characterised by inadequate housing, and people living in these areas are often unemployed or informal workers (United Nations, 2020).

1 billion people live in informal settlements worldwide (United Nations, 2020), and there is an upward trend in informal settlement populations (Samper, Shelby, & Behary, 2020). 8 per cent of the Brazilian population (16,6 million people) lives in informal settlements and favelas according to the preliminary data collection for the census 2022 (Confederação Nacional de Municípios, 2025). Above the Brazilian average, the focus areas of this research, Rio de Janeiro and Belo Horizonte (Brazilian cities), were estimated to have respectively over 19 per cent and over 11 per cent of households living in informal settlements (Instituto Brasileiro de Geografia e Estatística [IBGE], 2019).

Figure 1. Focus areas of the pilot study. Figure adapted by the author and based on data from the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística [IBGE], 2019).

Although informal settlements vary across Brazil, they share some characteristics. Their emergence is related to historical migration from the countryside to cities, particularly in the 1940s in the case of favelas. Their infrastructure is precarious. For instance, often there are no water, sanitation, and energy grids, and elementary urban services (e.g., waste collection, sewage treatment, Internet, water and energy supply). Communities are mostly made up of minority groups (Black and Brown) and of informal and low-income workers, who do jobs such as construction work, cleaning, waste picking and collection (Musumeci, 2016).

There is growing research on the role of design and designers in supporting underrepresented Brazilian communities and aiming at societal change. These studies adopt different design philosophies and approaches as follows:

1. Design as an economic activity that can contribute to situated product-service solutions as well as to local businesses' innovation, development and growth (e.g., start-ups) (Khara & Fudarba Curcio, 2024);
2. design as an enabler of participation and collaboration for inclusive urban planning and social justice (Viana & Loschavio dos Santos, 2020; Lima, 2019; Wilson, Thoma, & Loschavio dos Santos, 2024);
3. design and diffuse design (or the natural ability to design based on everyday practice by lay people, see Manzini [2015a]) as ways of challenging oppression and power relations (Viana & Loschavio dos Santos, 2020; Lima, 2019; Oliveira Serpa & Batista Silva, 2021; Seldin, 2024).

The first uses design as an instrument to capitalise on the economic potential within a neoliberal perspective, where community members are seen as recipients of design processes. The latter two advocate for community empowerment, social and political transformation, where community members' agency is central in design processes.

2. Methodology

This qualitative and exploratory design research, or research through design, had its primary data collection based on online roundtables conducted with community members living in informal settlements in two Brazilian cities, Rio de Janeiro and Belo Horizonte. The research activities needed to be conducted online due to travel and other restrictions and health advice during the pandemic. The roundtables enabled conversations about the COVID-19 pandemic circumstances and impacts in the communities. Also, they helped to foster connections and collaborations on preventative measures and the sharing of resources between the different communities which joined the study. These roundtables had the participation of not-for-profit (or non-governmental) organisations' representatives who actively helped these communities mitigate the effects of the pandemic. Secondary data collection included public data (from NGOs' and community members' social media posts, websites, and press news).

The online roundtables were conducted during the very beginning of the COVID-19 pandemic in Brazil in 2020 with community members representing two informal settlements in Belo Horizonte and three informal settlements in Rio de Janeiro (please see Tables 1 and 2 for further details). These were audio and video recorded. Each roundtable had a mediator and a time moderator to facilitate equal participation among participants. Notes were also taken by observers during the conversations, besides the transcriptions. This research was only possible at that time due to the successful international collaboration between the research teams in the UK and Brazil. The Brazilian research team had already been building a good relationship through their continuous work with the communities we could invite to participate in this research.

Table 1. Belo Horizonte online roundtable.

Roundtable role	Role	Related community	Gender
Participant 1	NGO representative, community member	Community A	Male
Participant 2	NGO representative	Community A	Male
Participant 3	Kindergarten teacher, community member and volunteer	Community B	Female
Participant 4	NGO representative and community member	Community B	Male
Mediator	Researcher	University (UK)	Female
Time moderator	Master student	University (Brazil)	Male
Observer 1	Professor	University (Brazil)	Male
Observer 2	Professor	University (Brazil)	Female
Observer 3	PhD student	University (Brazil)	Female

Table 2. Rio de Janeiro online roundtable.

Roundtable role	Role	Related community	Gender
Participant 5	Nurse, doula and community member	Community C	Female
Participant 6	Journalist and community member	Community D	Female
Participant 7	NGO representative and community member	Community D	Male
Participant 8	Educational project founder and community member	Community D	Female
Mediator	Researcher	University (UK)	Female
Time moderator	Master student	University (Brazil)	Male
Observer 2	Professor	University (Brazil)	Female
Observer 3	PhD student	University (Brazil)	Female

Three online roundtables' conversations were run in Portuguese, the first language of the communities. One was conducted with community members living in Belo Horizonte. Another one took place with people living in Rio de Janeiro. After these two roundtables, the conversations were transcribed. The conversations helped the research team draft maps that made visible the problems, adaptive strategies and actions as well as challenges for communities regarding the first warnings about the COVID-19 pandemic when it was reaching the country, prevention, diagnosis, treatment, and support available for communities and created by communities. These first maps were shared with

community members from both cities in a third roundtable. Amendments were made according to their comments on each map. These mapping processes clarified the factors affecting the ability of community members to protect their health, and their interrelation, making visible community knowledge and actions that mitigated the impact of the COVID-19 pandemic on communities based on their lived experiences. These were also useful to identify challenge areas for communities and their needs (please see Fonseca Braga et al., 2020 for a further and detailed explanation of this research phase). All the data generated during the collection and analysis were translated into English.

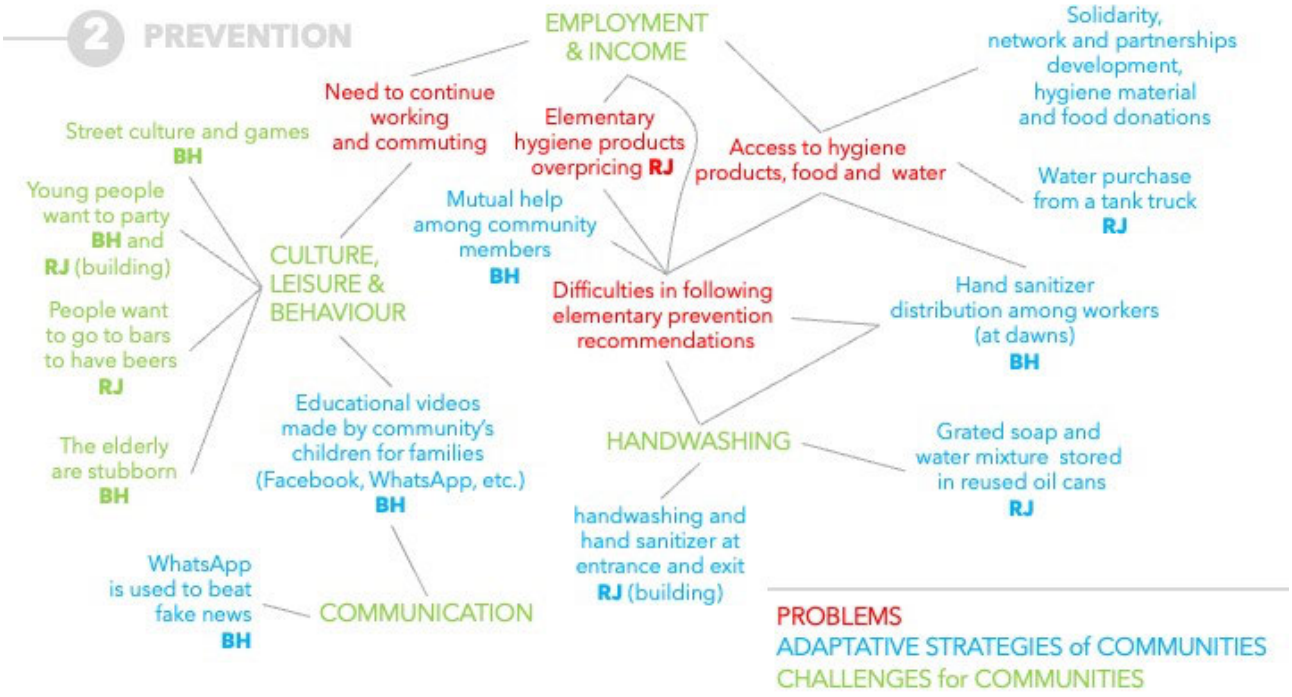

Figure 2: Example of a map made with communities (Fonseca Braga et al., 2020).

After that, the research team further analysed the transcriptions and the first maps generated, which gave a holistic view on the factors affecting the capacity of communities to prevent and mitigate the impacts of the COVID-19 pandemic. This further analysis enabled us to identify barriers, challenges, communities' strategies and their relations to 5 key areas affecting those: infrastructure, politics, public policy and service, behaviour and culture, and socioeconomic determinants (Figure 3).

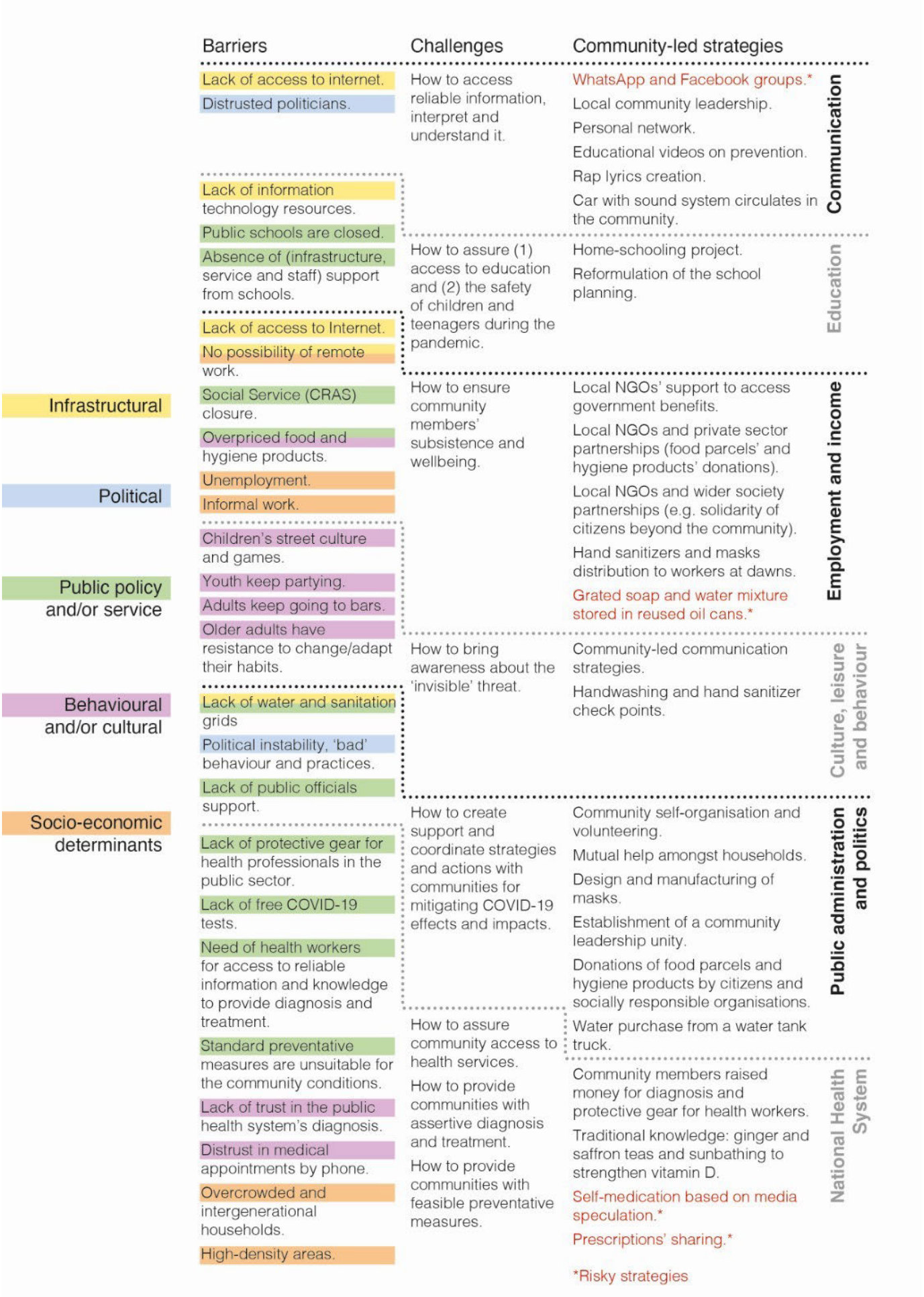

Figure 3. Map of the barriers, challenges, and community-led strategies for tackling the COVID-19 pandemic (Fonseca Braga et

al., 2021).

A third research stage explored and defined the designers' capabilities that could support community resilience (Figure 3).

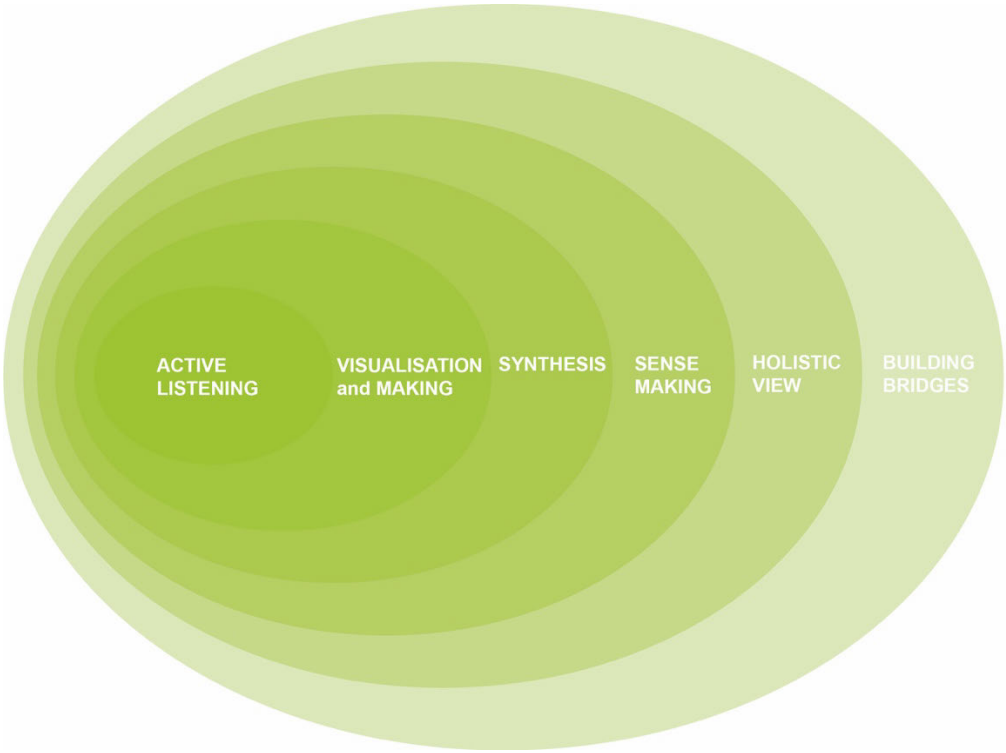

Figure 4. Design capabilities for community resilience (Fonseca Braga et al., 2022).

This paper expands on this third research stage, highlighting the critical need for socially responsible community empowerment in the new public governance in which community resources and capabilities are key assets, especially with under-resourced health systems and the plummet in public budget spending. It analyses particularly the transition towards community-led governance based on emerging community leadership observed in the communities that joined this pilot study. It focuses on the aspects that this transition should entail, supported by design approaches and processes, to contribute to socially responsible community empowerment.

3. Communities' capabilities and limitations

Preventative measures and advice proposed through global health policies, such as handwashing with water and soap, social distancing, self-isolation and remote work, were often not possible to be followed by communities living in informal settlements. These measures were unfeasible for communities because of several interrelated factors including the infrastructure of these territories, socioeconomic determinants, public policies and services that did not meet the specific circumstances and needs of communities alongside cultural, behavioural aspects and political climate.

Many factors made prevention even more challenging for communities. Hygiene products were overpriced during the pandemic which made these unviable for them. Additionally, the lack of appropriate infrastructure, such as water and sanitation grids; and the absence of Internet services combined with the kinds of jobs often done, that require commuting and being present at the work venue (e.g., cleaners, construction and informal workers), did not enable remote work.

"... this issue of prevention is very complex. [...] we had guidance like 'keep socially

> isolated', 'use hand sanitiser', and 'wash your hands frequently'. Mate, none of this applies to our reality. Maintaining social distancing, there's no way… We live in packed houses, sometimes with more than 10 people. […] Wash hands frequently, also no. We have a problem with the lack of water. This is recurring. It's something that is part of our reality. So, it becomes one more problem. And another one was hand sanitiser. We are talking about informal workers, who don't have savings for emergencies like this COVID one. So, they couldn't include this additional survival cost well into their budgets." Community member, NGO representative.

Other frustrations of community members came from the measures regarding a possible diagnosis, which was not accurate due to the lack of tests. COVID-19 symptoms could be confused with several tropical diseases' symptoms, which led to inaccurate diagnoses. When people were possibly diagnosed, they were requested to self-isolate. Self-isolation was not feasible in their circumstances of crowding and intergenerational households.

Public support available was mostly provided through online systems. This worsened access to those benefits. Moreover, some people were 'not found' on these public online records used on these public online platforms.

Furthermore, the political climate and the distrust of communities in politicians also worsened the belief that the COVID-19 virus was real, as it could not be seen by the naked eye even when they were working in health areas. A community member, who is a nurse and doula, shared their lack of belief in it during one of our conversations: "Does it [the COVID-19 virus] really exist? Might it not just be a manipulation? Could there be a hidden political interest in all this?".

A political factor that contributed to that was the continuous dispute between opposing parties. This led people to think the virus could be an 'invention' created with hidden political intentions. Additionally, politicians who say they will improve community territories and circumstances during elections but do not commit to their pledges made after being elected. This contributed to community distrust.

On the other hand, it was clear that emergent community leadership was critical to making a difference in their communities. Community members interested in enhancing the future of their communities have been founding their own not-for-profit (or non-governmental) organisations supporting education, participation in sports, creative arts and music. These NGOs covered public policies' and services' gaps and deficiencies during the COVID-19 pandemic, promoting social cohesion and organisation to tackle the pandemic challenges and making partnerships with charities and private sector companies. Their initiatives helped to provide communities with hygiene products, masks, food parcels, as well as access to Internet services. They also coordinated several social solutions in order to communicate information about the COVID-19 pandemic in accessible ways. For example, co-creating short videos and using sound cars to disseminate information in the communities. Other initiatives included coordinating collaboration with healthcare professionals in their communities, mask production and distribution in their communities, and generating "self-isolation" alternatives among households in the communities. Additionally, protective gear was lacking in the local public health system and was also provided through the support of communities.

However, these community-based resources or capabilities also had their limitations. This was noticed particularly when people needed to take risks aiming to protect their health. For instance, when a health expert, professional advice and diagnosis were needed but could not be reached or accessed. This led community members to risky alternatives

such as prescription sharing and self-medication based on media speculation.

4. Socially responsible community empowerment

Citizens' capabilities were identified and classified in prior literature (Manzini, 2015a, 2015b). These are considered critical to public work (Dong, 2008) and to the new public governance (Julier, 2017) and the future of governance (Manzini, 2019) in a rationale grounded in community engagement, empowerment and ownership. There is growing research on the diffuse design capabilities of underrepresented and underserved Brazilian communities (e.g., Viana & Loschavio dos Santos, 2020; Seldin, 2024). However, these diffuse design capabilities are still mostly unknown or poorly documented in health and well-being. Understanding communities' or citizens' capabilities and their limitations is fundamental, particularly in areas of public health. Diffuse design and collective community-based solutions are seen as a form of political resistance that can lead to social transformation, challenging power relations and responding to neglect (Viana & Loschavio dos Santos, 2020; Seldin, 2024). Nevertheless, precarious diffuse design practices which can put communities at risk rather than benefit their lives should not be ignored. Therefore, we need to help build spaces for communicating and escalating communities' voices, values and needs, besides their capability to resist. We need to be able to influence decision-making processes that affect communities' lives, making neglect unacceptable in the public sector.

Furthermore, most literature draws on the benefits of design approaches in the public space, but they do not clarify the limitations in sharing or transferring these functions to different stakeholder groups and communities. This is a key point as these roles were originally taken by the public sector, for example, being carried out by civil servants, policymakers, government agency members, and people specialised in implementing policies for the public sector (for instance, through tenders). This can lead to important implications for citizens who take or share these roles and their related responsibilities, especially in health and well-being.

In this context, designers could play a meaningful role in supporting community-led governance and empowerment over their lives, over their health. Different contexts and communities require situated initiatives. On the one hand, the learnings from this pilot research showed the importance of addressing community capacity, resources or capabilities and their limitations as a necessary step for informing socially just or equitable public policies and services that should meet communities' needs and are particularly critical to them during emergencies like the COVID-19 pandemic. On the other hand, designers can also support a vision of and from communities about what they aspire to from the medium to the long term.

4.1. Designing equitable policies

It would be naive to assume that this collaborative work is defined only by the community's will. The active engagement and will from different stakeholder groups, including (but not limited to) civil servants, policymakers and politicians are still crucial to enabling and facilitating communities' safety, security, health, vision and aspirations.

In this context, socially responsible design jobs include navigating different political climates and identifying potential community supporters and advocates in the public sector that can influence decision-making. Designers should consciously advocate and raise the communities' voices and needs in a socially responsible way in these design processes. This includes identifying what puts communities at risk and helping to promote and co-design more equitable solutions that help to tackle the challenges that

lead to communities' risk-taking actions. People do not take these risks for free; they do not see other ways they could deal with a challenge when the solutions available to them are not feasible in the circumstances they find themselves in. Therefore, identifying and making visible the challenges and their triggers in the lived experiences of communities is critical. This enables better informed development of socially just or equitable public systems, policies and services.

For example, if communities do not have access to Internet services and these cannot be fairly provided to communities, other alternatives could be created considering their resources and capabilities. By fairly provided, I mean provided in a way that people can make a well-informed use of a service or can make informed decisions and take well-informed actions. Hence, knowing communities' capabilities and resources in protecting their health could enable us to identify focus areas for public budget spending or the areas and needs that communities require public and expert support to deal with a challenge.

It is our social design job to help clarify these challenges based on the lived experiences of communities and contribute to influencing change in the way these public systems, services and policies are designed and implemented, developing further socially responsible design research and practices for equitable policymaking. In this sense, these design processes could be inspired and learnt from Freire's work, in a diversity of design aspects, from co-designing communication that is accessible to communities, understanding their day-to-day language(s), to bringing people's lived experiences of not only going through challenges but also of creating solutions to their problems in a mutual learning approach. However, precarious community-led solutions that put community members' lives at risk should not be acceptable. Hence, designing equitable policies also involves acknowledging the need to identify and understand risky strategies and actions during co-design processes and address the factors triggering those.

4.2. Towards community-led governance

Community leadership was critical to promoting social cohesion and organisation or collaborative strategies and actions to mitigate the COVID-19 pandemic impacts and protect their health when public services and policies did not suit them in this pilot research. This shows that there are communities capable of fostering and developing community-led governance that could be key to defining the futures of governance, democracy and policymaking. In this scenario, socially responsible design is needed to support this leadership in thriving as well as to explore and define innovative policymaking systems and public policies that are effective for communities to protect their health.

However, the limitations of communities' capabilities and their impacts make a socially responsible design approach to community empowerment necessary. This socially responsible design approach should be committed to raising and making visible the lived experiences, voices and needs of communities. In these terms, there is still much to be understood about how (social) designers and (social) design could support community leadership to thrive. I draw on starting points to define an agenda on that.

At the strategic level, we need to be able to navigate and negotiate in different political climates and public sector systems, supporting communities' needs and relationship building with different stakeholder groups that are necessary to be involved for the improvement of their capability "to live the kind of lives they value - and have reason to value" (Sen, 1999). Questions such as 'Who should be involved and can contribute to

enhancing or enabling responsible community capability development?', 'How can we meaningfully engage them and foster a commitment to communities' needs and visions?' could be ways of exploring, reflecting and defining ways of achieving this with communities.

At the operational socially responsible design level, we still need to explore and define further how communities' capabilities can be mapped and understood quickly. Although this could ideally be a continuous design work with communities, during an emergency like the COVID-19 pandemic, this should be a job done safely for all the people involved and in time to inform the development of suitable, viable and feasible public support, services and policies. These should be effective for communities respecting and addressing their lived experiences, livelihood diversity and socioeconomic determinants. Questions such as 'How can (social) design and designers' skills and methods develop further and contribute to this deep understanding?', 'How can this deep understanding of communities' capabilities and their limitations effectively inform policymaking, public systems and services development and innovation?' could be starting points to explore and define community-led governance in which community empowerment is socially responsible and concerned with designing equitable policies.

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About the Author:

Mariana Fonseca Braga is a design researcher and educator interested in socially responsible design research, education and practices. Her work aims to inform socially just solutions (e.g., public policies, services, systems, technologies) and equitable innovation in community health and well-being.

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Visual Design as a Catalyst for Social Development: Insights into Beijing's Community Cultural Construction and Social Participation Mechanisms

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ABSTRACT | This study investigates the pivotal role of visual design in enhancing community cultural construction in Beijing, China, while examining the intricate mechanisms of social force engagement in this endeavour. Drawing extensively from domestic and international literature, it underscores the escalating significance of visual design within the realm of social culture, particularly highlighting comparative case studies on community image revitalization and cultural heritage preservation in East Asia and Northern Europe. Despite Beijing's abundant research on community cultural construction, a notable gap persists in exploring specific mechanisms and implementation strategies, particularly when juxtaposed with Shanghai, Guangzhou, and Hong Kong. This project bridges this gap through meticulous surveys of emblematic Beijing communities, employing a blend of case studies, questionnaires, and in-depth interviews. Our findings elucidate the distinctive function of visual design in fostering community cultural development, revealing its efficacy as a medium for cultural expression and communication. We dissect how visual elements—such as colour, graphics, and typography—meld residents' cultural perceptions, evoke emotional resonance, and shape behavioural patterns. Furthermore, we scrutinize the roles and participation modes of diverse social forces, including governments, NGOs, residents' groups, and enterprises. The study acknowledges the intricacies of data collection and processing, the challenge of case selection, and the necessity for actionable policy recommendations. A key case study, the transformation of Beijing's Hepingli (和平里) community, is analysed to illustrate the practical application of visual design in fostering social development and cultural

preservation.

KEYWORDS | Visual Design, Social Development, Social Participation Mechanisms, Cultural Heritage Preservation, Hepingli Community

1. Introduction

Visual design has emerged as a critical tool in cultural expression and social development, bridging tradition and modernity while fostering community identity and cohesion (Li & Choe, 2023). In Beijing, a city with a rich cultural heritage and diverse social fabric, visual design plays a pivotal role in community cultural construction, offering unique opportunities to explore its impact on social participation and cultural preservation (Jiansheng, 2019; Wang et al., 2021). This study situates Beijing as a compelling case study to examine the interplay between visual design and social development.

Despite Beijing's extensive research on community cultural construction, there remains a significant gap in understanding the specific mechanisms and implementation strategies driving these efforts, particularly when compared to other major Chinese cities like Shanghai, Guangzhou, and Hong Kong (Beijing, 2022). This study seeks to address this gap by investigating how visual design and social forces collaboratively shape community development in Beijing, with a focus on the Hepingli community as a case study.

This study aims to achieve two primary objectives: first, to explore the role of visual design in fostering community cultural development, focusing on its ability to convey cultural identity and evoke emotional resonance; and second, to examine the engagement mechanisms of diverse social forces, including government agencies, NGOs, residents, and enterprises in this process.

This research contributes to the growing discourse on visual design as a catalyst for social development, offering theoretical and practical insights for policymakers, designers, and community leaders. By providing actionable recommendations, the study aims to enhance the effectiveness of visual design initiatives in promoting cultural preservation and social participation in urban communities.

2. Literature Review

2.1. The Role of Visual Design in Social Development

Visual design has historically served as a powerful medium for cultural expression, from ancient cave paintings to modern digital interfaces, reflecting societal values and aspirations (Clottes, 2020; Meggs & Purvis, 2011). In contemporary contexts, visual design is increasingly recognized for its ability to foster social cohesion, shape cultural identity, and influence behavioral patterns. Theoretical frameworks, such as semiotics and visual

communication theory, highlight how visual elements like color, typography, and imagery can evoke emotional resonance and convey complex cultural narratives (Hall et al., 2024; Kress & Van Leeuwen, 2020; Lupton & Phillips, 2015). Successful initiatives, such as the use of murals in Bogotá, Colombia, to promote social inclusion and the revitalization of public spaces through graphic design in Barcelona, Spain, demonstrate the transformative potential of visual design in community development (García, 2010; Sasser, 2017). These examples underscore its capacity to bridge cultural divides, enhance civic engagement, and promote sustainable urban growth.

2.2 Community Cultural Construction in Beijing

Beijing, as China's cultural and political center, boasts a rich heritage and a diverse community landscape, making it an ideal setting for exploring the intersection of visual design and social development. Existing research on Beijing's community cultural initiatives highlights efforts to preserve traditional neighborhoods (hutongs) and promote public art, yet it often lacks a detailed analysis of implementation strategies and stakeholder engagement (Wang, 2016; Wang, 2023). Compared to Shanghai, Guangzhou, and Hong Kong, where community cultural construction is often driven by innovative design policies and strong public-private partnerships, Beijing's approach remains understudied, particularly in terms of visual design's role (Wu, 2007; Zhang et al., 2020). This gap underscores the need for a deeper exploration of Beijing's unique mechanisms and challenges.

2.2. Comparative Case Studies: East Asia and Northern Europe

Lessons from Japan's "Machizukuri" (town-making) movement and Sweden's "Folkhemmet" (people's home) concept provide valuable insights into the role of visual design in cultural preservation and community revitalization (Evans, 2002; Grundström & Molina, 2016; Watanabe, 2006). In Japan, community-driven design initiatives have successfully integrated traditional aesthetics with modern functionality, fostering a sense of belonging and cultural continuity. Similarly, Sweden's emphasis on inclusive design and public participation has strengthened social cohesion and urban resilience. These case studies highlight the importance of collaborative approaches and culturally sensitive design strategies, offering a framework for Beijing to enhance its community cultural construction efforts (Duxbury & Jeannotte, 2011).

3. Methodlogy

3.1. Research Design

This study employs a mixed-methods approach, integrating qualitative and quantitative techniques to provide a comprehensive understanding of the role of visual design in Beijing's community cultural construction. The qualitative component includes case studies and in-depth interviews, offering rich insights into stakeholder perspectives, while the quantitative component involves surveys to gather measurable data on community

perceptions and engagement (Koskinen, 2012; Patton, 1990) . This approach is justified by its ability to triangulate findings, ensuring a robust and nuanced analysis of complex social phenomena.

3.2. Case Selection

Emblematic communities in Beijing were selected based on their cultural significance, diversity, and active engagement in cultural construction initiatives. The chosen communities include traditional hutong neighborhoods, modern residential complexes, and mixed-use urban areas, representing a spectrum of cultural and social contexts. These communities were selected to ensure a holistic understanding of how visual design operates across different urban landscapes, from historic preservation sites to rapidly developing districts. The Hepingli community, a historically significant area undergoing transformation, serves as a key case study to illustrate the practical application of visual design in fostering social development.

3.3. Data Collection

Data was collected through three primary methods: surveys, interviews, and visual material analysis. Surveys were distributed to residents, visual designers, and community leaders to gather quantitative data on perceptions of visual design and its impact on cultural identity. In-depth interviews were conducted with government officials, NGO representatives, and local business owners to explore the roles and challenges of various social forces in community cultural construction. Additionally, visual materials such as posters, signage, and public art installations were analyzed to assess their cultural and communicative functions.

3.4. Data Analysis

Qualitative data from interviews and visual materials were analysed using thematic analysis to identify recurring patterns and themes related to visual design's role in community development (Dexter, 1970). Survey responses were subjected to statistical analysis to determine correlations and trends in community perceptions and engagement levels. The findings from both qualitative and quantitative analyses were synthesized to provide a comprehensive understanding of the mechanisms through which visual design fosters social development, offering actionable insights for policymakers and practitioners.

4. Findings

4.1. The Role of Visual Design in Community Cultural Construction

Visual design plays a pivotal role in shaping cultural perception and fostering emotional

resonance within Beijing's communities. The strategic use of visual elements such as color, graphics, and typography has been shown to influence how residents perceive and engage with their cultural environment. For instance, the use of vibrant colors in public art installations in the Dashilar hutong district has revitalized the area, created a sense of pride and belonged among residents (Zhang, 2020; Zhang & Xin, 2023). Similarly, the integration of traditional Chinese calligraphy and modern typography in community signage has bridged the gap between historical heritage and contemporary urban life, enhancing cultural continuity and identity (Tversky, 2013; Zhang et al., 2008).

In the Hepingli community, visual design has been instrumental in transforming the area into a vibrant cultural hub. The community's redesign incorporated traditional Chinese motifs into modern urban infrastructure, creating a seamless blend of old and new. For example, the use of traditional lattice patterns in street furniture and public art installations has reinforced the area's cultural identity while meeting the needs of a modern urban population. This approach has not only preserved the community's historical character but also fostered a sense of pride and ownership among residents.

4.2. Mechanisms of Social Force Engagement

The engagement of diverse social forces is critical to the success of community cultural construction in Beijing. Government initiatives play a central role in providing the necessary policies, funding, and regulatory frameworks to support these efforts. For instance, the Beijing Municipal Government has implemented policies that promote the integration of visual design into urban planning, such as the "Beautiful Beijing" initiative, which focuses on enhancing the city's aesthetic appeal and cultural vibrancy (Rocha, 2017). These policies provide a foundation for community cultural projects, ensuring their alignment with broader urban development goals.

In the Hepingli community, the local government collaborated with NGOs, residents, and businesses to implement a comprehensive visual design strategy. As illustrated in Figure 1, a stark contrast exists between the unrenovated community corridor and its post-intervention state. In-depth interviews with residents revealed that the visual redesign contributed to enhanced social cohesion and strengthened cultural identity within the neighbourhood. NGOs such as the Beijing Cultural Heritage Protection Centre played a key role in advocating for the preservation of traditional architectural elements, while residents' groups contributed local knowledge and cultural insights. Businesses, through corporate social responsibility (CSR) initiatives, provided funding and creative expertise, resulting in a cohesive and culturally resonant urban environment.

Figure 1 Visual reconstruction of Hepingli Community corridor before and after

4.3. Challenges and Opportunities

Despite the positive impact of visual design on community cultural construction, several challenges persist. Data collection and processing present significant hurdles, particularly in gathering comprehensive and accurate information from diverse sources. Ensuring the reliability and validity of data requires meticulous planning and execution, which can be resource-intensive. Case selection is another challenge, as the diversity of Beijing's urban landscape necessitates careful consideration to ensure that chosen communities are representative and provide meaningful insights. Additionally, translating policy recommendations into practice often encounters institutional and operational constraints, underscoring the need for persistent coordination among stakeholders.

However, these challenges also present opportunities for leveraging visual design to address community-specific needs. By adopting a participatory approach that involves residents, designers, and policymakers, communities can develop tailored solutions that reflect their unique cultural and social contexts. For example, the use of co-design workshops in the Hepingli community enabled residents to actively contribute to the design of public spaces, ensuring that these spaces meet their needs and preferences (Federation, 2024). Furthermore, advancements in digital technology offer new

possibilities for visual design, such as augmented reality (AR) and virtual reality (VR), which can enhance cultural experiences and engagement. By embracing these opportunities, Beijing's communities can continue to harness the power of visual design to foster cultural identity, social cohesion, and sustainable development.

5. Discussion

5.1. Visual Design as a Medium for Cultural Expression

Visual design serves as a powerful medium for articulating cultural identity and fostering social cohesion within communities. By leveraging elements such as color, typography, and imagery, visual design communicates cultural narratives that resonate with residents and visitors alike. In Beijing, the integration of traditional motifs with modern aesthetics has proven particularly effective in bridging the gap between historical heritage and contemporary urban life. For example, the use of traditional Chinese patterns in public art installations in the Qianmen district not only preserves cultural heritage but also creates a sense of continuity and pride among residents (Wang, 2017). This interplay between tradition and modernity ensures that cultural identity remains relevant in a rapidly urbanizing context, fostering a shared sense of belonging and community.

5.2. The Interplay of Social Forces

The success of community cultural construction in Beijing relies heavily on the collaborative dynamics between government, NGOs, residents, and businesses. Government initiatives provide the necessary policies, funding, and regulatory frameworks to support cultural projects, ensuring their alignment with broader urban development goals. For instance, the "Beautiful Beijing" initiative has been instrumental in promoting the integration of visual design into urban planning, creating a foundation for community cultural projects (Rocha, 2017). However, the role of NGOs and residents' groups is equally critical, as they bring localized perspectives and grassroots efforts to the table. Organizations like the Beijing Cultural Heritage Protection Center have been pivotal in preserving traditional neighborhoods and fostering community engagement through visual design.

Inclusive and participatory approaches are essential for ensuring that community cultural projects reflect the needs and aspirations of residents. Co-design workshops, such as those conducted in the Hepingli community, enable residents to actively contribute to the design of public spaces, ensuring that these spaces are both functional and culturally meaningful. Similarly, enterprise participation through CSR initiatives and public-private partnerships brings creative expertise and financial resources to community projects. A notable example is the collaboration between a major real estate developer and Beijing Design Week, which transformed an abandoned industrial factory into the event's permanent venue under the principle of low-carbon sustainability. Through dynamic visual interventions, the revitalized space exemplifies an innovative integration of visual design and sustainable urban practice. As depicted in Figure 2, the

adaptive reuse strategy not only preserved the factory's architectural heritage but also activated the surrounding neighbourhood through strategically implemented visual elements.

Figure 2 Beijing Design Week permanent venue
(https://baijiahao.baidu.com/s?id=1829655802343511940&wfr=spider&for=pc
http://xhslink.com/a/HyQbZoR0urWcb)

5.3. Challenges and Opportunities

To fully harness the potential of visual design in community cultural construction, it is essential to integrate it into urban planning and cultural policies. Policymakers should prioritize the development of frameworks that support the use of visual design in public spaces, ensuring that it is both accessible and culturally relevant. For example, guidelines for incorporating traditional motifs into modern designs can help preserve cultural heritage while promoting innovation. Additionally, funding mechanisms should be established to support community-led visual design projects, ensuring that resources are allocated equitably and effectively.

Enhancing stakeholder collaboration and resource allocation is another critical strategy for addressing the challenges of community cultural construction. Establishing platforms for dialogue and collaboration between government agencies, NGOs, residents, and businesses can facilitate the sharing of resources and expertise. For instance, the creation of a "Community Design Council" in Beijing could provide a forum for stakeholders to coordinate efforts and develop integrated solutions. Furthermore, leveraging digital technologies such as augmented reality (AR) and virtual reality (VR) can enhance the impact of visual design by creating immersive cultural experiences that engage a wider audience. By adopting these strategies, Beijing's communities can continue to leverage visual design as a catalyst for social development, fostering cultural identity, social cohesion, and sustainable urban growth.

6. Conclusion

This study highlights the distinctive role of visual design in Beijing's community cultural construction, demonstrating its capacity to articulate cultural identity, foster social cohesion, and shape behavioral patterns. Through the strategic use of visual elements such as color, typography, and imagery, communities can preserve their heritage while adapting to modern urban contexts. The research also reveals the critical mechanisms through which social forces—government agencies, NGOs, residents, and businesses—engage in cultural initiatives. Collaborative efforts, such as public-private partnerships and grassroots projects, underscore the importance of inclusive and participatory approaches in achieving sustainable community development.

This study bridges the gap between theory and practice by providing a comprehensive framework for understanding the role of visual design in social development. By analysing successful initiatives and stakeholder dynamics, the research offers actionable insights for policymakers, designers, and community leaders. These insights can inform the development of culturally sensitive design policies and collaborative strategies that enhance community engagement and resource allocation. The findings contribute to the growing discourse on visual design as a tool for fostering cultural preservation and social cohesion in urban contexts.

Visual design holds immense potential as a catalyst for sustainable social development. By integrating traditional and modern aesthetics, fostering stakeholder collaboration, and leveraging innovative technologies, communities can create culturally vibrant and socially inclusive spaces. As Beijing continues to evolve, the strategic use of visual design will remain essential for preserving cultural heritage, promoting social cohesion, and enhancing the quality of urban life.

7. Future Research

7.1. Long-Term Impact of Visual Design

Future research should explore the long-term impact of visual design initiatives in rapidly urbanizing contexts, particularly in cities like Beijing. Investigating how these initiatives sustain cultural identity and social cohesion over time will provide valuable insights into their effectiveness and adaptability. This research could also examine the role of digital technologies, such as augmented reality (AR) and virtual reality (VR), in enhancing the longevity and accessibility of visual design projects.

7.2.Comparative Studies

Expanding the research to other cities in China, such as Shanghai, Guangzhou, and Shenzhen, as well as internationally, would offer a broader perspective on the role of visual design in community cultural construction. Comparative studies could identify best

practices and innovative approaches that can be adapted to different cultural and urban contexts, enriching the global discourse on visual design and social development.

7.3. Framework Development

Developing a comprehensive framework for evaluating the effectiveness of visual design in community cultural construction is essential for guiding future initiatives. This framework should include metrics for assessing cultural preservation, social cohesion, and community engagement, as well as guidelines for stakeholder collaboration and resource allocation. Such a tool would provide policymakers and practitioners with a standardized approach to designing and implementing impactful visual design projects.

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VISUALISING ORGANISATIONAL SYSTEMS: A RELATIONAL GRAPH APPROACH

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ABSTRACT | This interactive 30-minute X-session invites participants to experiment with a new visualisation methodology currently in development.

KEYWORDS | ORGANISATIONAL DESIGN, HUMAN SYSTEMS DESIGN, ETHICAL DESIGN VISUALISATION, SYSTEMS THINKING

1. Overview

This interactive 30-minute X-session invites participants to experiment with a new visualisation methodology currently in development.

2. Rethinking Organisational Design

Social structures shape individual behaviour by influencing habits, preferences, and opportunities (Bourdieu, 1977). Traditionally, organisational models (Mintzberg, 1979) have been the domain of management, yet structuring multi-actor social systems is also a design challenge—part of fourth-order design (Buchanan, 1992; Margolin, 2015).

Management and leadership disciplines have developed numerous ways to visualise organisations, including organisational charts, process diagrams, financial flows, communication streams and employee networks, and value chains, OKR systems. Conventional models, however, typically prioritise financial performance over social value creation.

How can we design organisational models that prioritise value creation over financial performance? How can we reinvent organisations, so that they, and the actors within them, behave more responsibly? What do we need to visualise in organisations so that new organisational models can be designed?

3. A New Visualisation Methodology

Previous research on replicable formats of social cooperation identified six key components: contributors, contributions, motivations, enablers, rules, and tools (Bujdosó, 2019b). To map these systematically, the Social Design Canvas was developed, helping users think strategically about social cooperation (Bujdosó, 2019a).

An ongoing study explores the use cases and effectiveness of the Social Design Canvas. This study demonstrates that the Contributors–Contributions–Motivations–Enablers part of the canvas resonates strongly with users of the tool, and helps them think strategically and systematically on various contributors in social cooperative projects. However, while the canvas effectively categorises elements, it does not illustrate their interconnections.

A new graph-based visualisation method is being developed to map relationships between contributors, contributions, motivations, and enablers. Inspired by the Connected Content framework (Atherton & Hane, 2018) and the Jobs to Be Done framework (Kalbach, 2020), this method adopts a relational graph structure, where contributors are nodes, and contributions, motivations, and enablers function as edges.

This approach could uncover feedback loops and leverage points in social systems (Meadows & Wright, 2008), supporting the creation of ethically sustainable organisational models.

4. The Session X

This session introduces and tests the new relational, graph-based visualisation methodology. Participants will explore how mapping social systems in this way can reveal underlying dynamics and inform ethical, responsive organisational design.

Researchers and practitioners from academia, civil society, public administration, and business are invited to engage in this collaborative experiment—contributing to the foundation of more ethically aligned, sustainable human systems.

5. Session Outline

- 5′ background research introduction
- 5′ introduction to the visualisation methodology
- 5′ task handout
- 10′ task completion
- 5′ feedback, reflection and questions

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WHAT IF DESIGN COULD TRANSFORM THE WAY WE THINK AND MAKE PUBLIC POLICIES ? PROPOSING A NEW MODEL : THE POLICY DESIGN JOURNEY

ABSTRACT | For about 15-20 years, a rather small – yet growing – community of designers started getting involved in public policy innovation and public problem solving activities. Those design activists (willing to work for the common good, public welfare and social justice) have decided to apply their design skills, tools and methods in order to help public authorities of all levels (from village, to city, metropolis, national governments, or EU commission, etc.) reset & solve public problems and/or fix public policies and public services. « Designing better policies for people, by people » could be their motto. In parallel to working on solving public problems, designers have also spend energy on training civil servants and sometimes elected officials about their design approach so as to empower them in replicating, once the designers are gone, some design-inspired techniques and tools such as co-design with users, involving citizens in policy ideation, prototyping and experimenting before implementing, etc. By doing so, designers slowly spread their know-how to equip public authorities with design skills and progressively transform them. At the same time, we started seeing the first public authorities which would offer to designers real official design positions within their own administrations. Designers would not be only consulting for public authorities but transforming public authorities from within (often linked with the creation of public policy innovation labs). If it's still too early to discuss the success and impact of this strategy on the long term, we can already observe that by applying design methods to policy making, a new way of creating policies is emerging, one inspired by design. In this paper, we'll propose to draw a new guiding approach to policymaking inspired by design. To do so, we will build upon the initial critics of the policy cycle model such as the one of Lasswell drawn in 1957 (still in use today as a reference model) which, despite its clarity and simplicity, is purely theoretical (too linear, too static and too rational) and never takes place in the « real world »

and question the actionability of policy threads or streams model as proposed by Howlett in 2015. Then, we'll look into how, in practice, designers have, through practice, « tinted » policy making with their own methods to finally, extract and draw a new model for policy making, one which would build upon the design thinking & doing methodology (questioning the double diamond of the UK Design Council) but also the design « spirit » (capacity to improvise, to detour, to navigate at ease through uncertainty, etc.). Considering public policymaking from the angle of a "journey" could enable designers but also public authorities to embrace the fact that true policy design is an unwritten voyage, made of choices, options, creative detours, opportunities, trips to the unknown, etc.

KEYWORDS | POLICY DESIGN, POLICY INNOVATION, SOCIAL DESIGN

Introduction

This paper examines the possible contributions of design approach to reshaping public policy making. Chapter 1 describes the evolution from ecodesign to service design and finally to social and public design, showing how designers have progressively expanded their focus from sustainability concerns to addressing public sector challenges. Chapter 2 examines the proliferation of Public-Sector Innovation labs (PSI labs) as institutional spaces where design practices are applied to policy making, highlighting both their potential and the resistance they face within traditional administrative structures. Chapter 3 explores how designers' distinctive postures and attitudes—including curiosity, attention to detail, empathy, and comfort with uncertainty—are gradually influencing civil servants' approaches to policy making through collaboration and training. Chapter 4 discusses the tentative visual representations of policy making processes as well as of design approach. Chapter 5 finally proposes a novel "Policy Design Journey" framework that reimagines policymaking as an organic, non-linear process where design methodologies can be meaningfully integrated at various crucial moments.

1. From ecodesign to service design and social & public design: the consolidation of an emerging practice

Since the early 2000s, a rather small – yet steadily growing – community of designers started getting involved in public policy innovation and public problem solving activities (Kimbell, 2009). Moving away from the private sector, those design activists decided to work for the common good, the general interest, by working directly with the public sector. If the industry knows how to use design for

its products and services, why not apply design also to the public sector for its public services and policies?

This does not come out of nowhere, it is in part the result of half a century of questioning on the role and impact of design on society: in terms of sustainability of course, but also economics and social impact. In 1971, Victor Papanek [1] wrote: 'There are professions more harmful than industrial design, but only a very few of them.' Yes, in a polluted planet and a society suffering an over-consumption illness (and a 'Kleenex culture' – meaning a use-and-throw culture), designers are part of the problem. They have a responsibility. As Alain Findeli (2010) reminds us: 'the end or purpose of design is [or should be] to improve or at least maintain the habitability of the world in all its dimensions."

The responsibility of design in some of the worlds' problems led to change of design practices (and design teaching) with green design appearing in the years 1980s, then ecodesign in the years 1990-2000, and sustainable design in the years 2005-2010 (Ceschin et al, 2020). 'This shows that the role of design has evolved and has integrated new concerns, thus making it a more responsible design that has oscillated between large focuses on environmental concerns and encompassing social and ethical concerns' (Vicente, Frazão, and Moreira da Silva, 2012).

In parallel, to integrating the concepts of ecodesign and sustainable design quite early on, design schools also started, in the years 2005-10, to develop the logic of product-service-system design (PSS) (such as the PSS master degree in the Politecnico di Milano). The idea? Products can be produced in better ways, more responsible ones, but they don't stand alone no more. In a service-based economy, products are part of a larger system that include services and in which interactions between actors play a key role, and all that could be designed. Not just the product alone.

Slowly, service design started to appear as a new discipline of design (Meroni, Sangiorgi, 2011) in design schools but also in design consultancies. Even though service design was, at first, largely private-oriented (and often focusing on digital user interface services), projects that would include (or be directly with) the public sector got more and more common. For example, design schools would not only work with private business anymore but also propose to their students to work on projects in direct collaboration with public authorities, in particular local governments (on cultural projects, public space and/or urban challenges, social services, etc.). But besides some occasional cooperation on projects, it took quite some time for design schools, to realize that a possibly new discipline of design (and market) was emerging, one purposely social and directly public-sector oriented. 'The primary purpose of design for the market is creating products for sale. Conversely, the foremost intent of social design is the satisfaction of human needs' (Margolin, 2002). This discipline or practice has a name: social design, or even public design (in dutch speaking countries in particular), and finally policy

[1] Victor Josef Papanek was an Austrian-born American designer and educator, who became a strong advocate of the socially and ecologically responsible design as early as the 1970s.

design (or design for policy) which could be seen as a sub-category within social & public design.

Despite variations, for Nynke Tromp & Stéphane Vial (2022), there are five components of social design:
1. Care-driven design activities for the wellbeing of underprivileged people,
2. Responsiveness-driven design activities for good governance,
3. Political progress-driven design activities for empowered citizens,
4. Social capital-driven design activities for beneficial communities, and,
5. Resilience-driven design activities for sustainable future systems

Social designers are now, in many countries, applying their design skills, tools and user-centered methods in order to help public authorities and institutions of all levels (from village, to city, metropolis, national governments, EU commission or international institutions such as OECD, 2022) reset and solve public problems and/or fix public policies and public services (Bason, 2014). 'Designing better policies for people, by people' could be their motto.

2. The integration of [social] design in public institutions: the Public-Sector Innovation labs (PSI labs)

'The public sector is now established in theory and practice as a major site for design activity' (Buchanan, 2020).

Two proofs of this phenomenon: the multiplication of design studios who have specialized in public design (it's important to mention that many of those design consultancies have played a pioneer role in the development of design for policy (Buchanan, 2020)) and the multiplication of public innovation labs (within public authorities). And we could possibly even add a third proof: the emergence of 'social design' courses (Tromp & Vial, 2022) or 'design for policy' masters degree specialization in design schools, but also the emergence of 'public design' courses in political science schools (such as Sciences Po in France for example). For this article, we'll mainly focus on this second proof or phenomenon: the rise of public innovation labs.

Indeed, 'innovation labs (i-labs) are becoming increasingly popular in the public sector' (Tõnurist et al., 2007, McGann, Blomkamp & Lewis, 2018). Mindlab (Copenhagen), Helsinki Design Lab (Finland), Nesta Innovation Lab (London), Kennisland (Amsterdam), Social Innovation Lab Kent – SILK (Kent), La 27e Région (Paris), the Australian Centre for Social Innovation - TACSI (Adelaide), MaRS solution Lab (Toronto), Public Policy Lab (New York), EU Policy lab of the Joint Research Center - JRC (EU Commission), are just a few of the – probably – most well-known public-sector innovation (PSI) labs (which integrate, at least in part, design activity) that exist worldwide (or have existed as some have gone extinct). But there are hundreds of similar labs throughout the world and keeping track of all of them is no easy task.

First, because they often operate at very various levels of governance. Indeed, PSI labs can be found at national levels, but also regional and local levels, and the latter ones can sometimes be harder to spot as their publicity is not necessarily very high and the publication of their work not systematic.

Second, because they, sometimes, carry very different names and present themselves (or are referred to) as: innovation units/departments, i-team or i-lab, public policy lab, change lab, design lab, social innovation lab (McGann, Blomkamp, Lewis, 2018) or creativity lab or public transformation lab. And the list can go on. But despite how they define or present themselves, they all try – more or less – to: improve, fix or create new public policies and/or services (policy result, outcomes, better services), instill a culture and posture of innovation within – and around – the institution (agility, flexibility, creativity), transforming ways of working (policymaking process, user-centered approach, co-creation, learning by doing, prototyping and experimenting), and finally promoting collective intelligence (in particular involving users and stakeholders). Often, labs also work in the future, or rather explore and invent desired futures (vision and scenario building), by using creative participatory foresight and design fiction methods (Pólvora and Nascimento, 2021) to pave future policies.

'Public authorities attempting to innovate face a delicate trade-off between "safe" procedures and "risky" innovations [...] The idea that tax revenues could be "wasted" on risky, doomed-to-fail experiments makes the public sector a place that doesn't naturally lend itself to innovation'. (Lewis, 2020). Public sector innovation labs are therefore seen as a good way to bypass this risk aversion by giving innovation an open and dedicated 'safe' space to experiment in and opportunities for collaboration on innovation across units, departments and sectors (Carstensen & Bason, 2012). In other words a dedicated sandbox or playground in which things that would not be allowed outside are exceptionally authorized inside. And by doing so, installing inside (or together with) public authorities, a certain practice and experience of innovation, so that in the end, 'Public-Sector Innovation (PSI) labs are helping to create a new era of experimental government and rapid experimentation in policy design' (McGann, Blomkamp, Lewis, 2018).

But one should not rejoice so quickly. Yes, labs multiply, but some also die (sometimes almost without notice), and most importantly, even though they mutltiply, they still vastly remain scarce in regard to the (potential) need. And it appears clearly that despite all the calls and various public announcements for more innovative, modern, agile, creative, efficient administrations, 'there are strong pressures to maintain the status quo, and fewer incentives to innovate than to not' (Hallsworth, 2011).

Even within public authorities that are 'equipped' with innovation labs, changing things are not easy. Indeed, public authorities who do host a lab don't necessarily do things differently or apply, at all levels of its institution the principles, approach, tools, postures promoted by the lab. Far from it. But we won't enter much in this specific question as this would require a deeper dive into the recent attempts to

evaluate and measure the impact of design interventions such as the one conducted by Jeanne Liedtka (2018) or the evaluation of the impact of innovation labs such as the ongoing work of Amy Zidulka et al (2024). We need much more research and evaluation on co-design for policy (Blomkamp, 2018) if we wish to have proofs of its transformative effects and added value on policies, institutions and people. What we know at least for the moment is that 'without the support of political leaders and top managers who lobby on their behalf, these laboratories could not continue' (Lewis, 2020).

People enjoy routines much more than they enjoy disruptions. This means that innovation labs are, at best, seen as object of curiosity (provoking a bit of interest) but most often as a rather 'possibly dangerous and disruptive new thing'. If not, sometimes, 'a new toy' of the managing directors. In his *Transformation Manifesto*, John Kao (2004) reminds us that 'every effort to change is accompanied by resistance, fear of the unknown, nostalgia for the status quo and concerns about the loss of efficiency and control that result from trying something new'. And any designer working for, with or within a public authority knows how well this resonates and how, despite giving design lectures, training workshops or design handbooks so as to re-assure about the process, the approach, etc., embarking civil servants (as well as elected officials) can be a tiring and tedious chore with uncertain results.

Are the public authorities who host a lab more innovative and deeply changed? We are in desperate need of proofs. Jean-Marc Weller and Frédérique Palle (2017) wondered: Is public innovation by design an 'underlying trend, revealing lasting changes in the forms of innovation in government, or is it a temporary phenomenon, the product of what some will call a 'fad'?'

3. Instilling designers' posture and attitudes within public authorities

While I share the warning that design thinking should not present itself as 'a wholesale saving grace' (Clarke & Craft, 2018) for today's policymakers to avoid the risk of overpromising and underdelivering, and while I also share the concern that innovation labs may disappear if it's unable to prove itself useful and necessary – despite satisfying the political strategy: 'Look! We innovate, we have a lab' –, I still believe that design has a lot to offer to modify, enrich, improve the way we make policies on an everyday basis.

Despite the reluctance of people, and institutions, towards what's new and disruptive, the more designers, civil servants and politicians collaborate, either through the PSI labs or design consultancy, the more they get familiar with each other's ways of working. In particular, since designers often intervene but also train civil servants along the way – usually through 'learning by doing'–, we observe that civil servants become more and more comfortable with understanding design concepts (and process) such as user-centered approach, field investigation, co-

creation with users, ideation, modeling and prototyping, experimenting and crash-testing, etc. We also see that civil servants are becoming more and more familiar with design tools. Indeed, they start manipulating – or at least knowing about – design tools such as personas, user journeys, system maps, story-telling and scenarios, etc.

This is not only the result of more and more design-based innovation projects but also the growing number of trainings, keynotes, lectures, courses about design thinking applied to the public sector. Again, conducting an analysis of trainings or ex-post evaluation of design thinking trainings would provide us rich and more qualitative insights on this aspect. As a result of this greater acquaintance and cooperation between designers and public authorities, we also see, regularly call for tenders from public institutions demanding explicitly for design support in installing co-creation processes, designing and conducting policy experimentations or participatory user-based diagnosis of a policy or service. 10 or 15 years ago, public call for tenders asking for design were quite rare. Conducting a review of the call for tenders (at leat at EU level) calling for design in the last two decades would be interesting in this regard to provide supporting evidence of this phenomenon.

What we see, from the practice, is that public institutions are, generally speaking, more and more familiar with design thinking or design-originated concepts. 10 years ago, in France, when I was asking civil servants I was training if they were familiar with public design, the vast majority of participants were answering 'no'. Today, at least half of them tell me they have a pretty good idea of what it is, even though they didn't use it or had experience yet working with designers. And a quarter of them tell us they already had trainings or lectures, or courses about it. Finally and obviously, a couple of them even have some experience working with design(ers) or using some design tools.

For those civil servants (but also eventually elected representatives), who had the opportunity to take an active part to design-led projects (whether the re-design of a policy or the design of a new public service for example), we realize that not only they are familiar with design process (or method), or even design tools, but they also became familiar with the design posture, or design attitude.

Of course, designers are not all alike but they all, (besides method and tools), adopt the following attitude or posture when given a problem:

- A high degree of curiosity, showing interest for everything, a certain willingness to learn, in particular topics or subjects they know nothing about yet ;
- An attention to details, showing high care for things that may sometimes, to others, seem anecdotical or useless. They pay attention to how things work, how they are built, how they stand, how they look.
- A care for esthetics, beauty matters for designers. It makes products, services, or policies more pleasant, more attractive, more appreciable.
- Empathy with users. Designers are focussing on answering to users needs by taking into consideration their struggles, their constraints and their diversity.

They don't design for an 'average lambda user' who does not exist, they design for real users who come with all sorts of feelings, emotions, worries, needs.

- A skill for bricolage. The 'Doing before thinking' (Jégou, Thévenet, Vincent, 2014) hands-on activity. Designers, obviously know how to draw and build things. But they also know how to build things out of the available bits and pieces around them. Make, then stepback, see, adjust, try and fix.
- At ease with uncertainty and improvisation. Designers are rather fine with blurriness and they tend to adapt quickly to changing situations or unexpected events or emerging opportunities. They're fine with modifying their original plans if need be.
- Friendly-hacking (Jégou, Thévenet, Vincent, 2014). 'An innovation is a successful disobedience, and local public authorities are embarrassed because they don't how to deal with that' said Jean-François Caron (ex-mayor of Loos-en-Gohelle and former regional councillor in Nord Pas de Calais). In this logic, designers often go towards things that are not explicitly and openly authorized (yet not illegal) so as to push boundaries and play with practices (in a friendly way – and for the common good) otherwise, it's difficult to really innovate within an overly-constrained and rigid system.

These attitudes or postures are not strictly limited to designers alone, but they remain unusual within public authorities. At least, they are not written anywhere as key values of public institutions or cited as key postures for civil servants by the top management. On the contrary. Planning, organizing, managing, executing, performing and supervising are more commonly met concepts within public authorities.

What is interesting to observe is that designers tend to bring those attitudes along with them in the public sector and it slowly, seamlessly, instills a certain "spirit" or "way of doing" things (Deserti & Rizzo, 2015, Kimbell & Bailey, 2017)). Couple of years ago, after having worked with a french public authority, we heard the civil servants say "we're going to do this project *à la manière de* (in the style of) the 27th Region[2]". This meant that, despite the tools or design process itself, the civil servants captured and appreciated the 'spirit' or rather, here, the 'style' of working of designers (which, besides the technical tools or methods, include informal, convivial, participatory, collaborative, friendly creative work) and that they were planning on trying to replicate it, 'à la manière de' designers. 'Anchoring this logic and these new practices within the administration requires a real change of culture and a significant increase in capacities' (Christiansen, 2016).

And it needs to work both ways. Indeed, 'we argue that if policymaking learns how to incorporate the insights from design thinking into policy, and design learns how to deal with the politics of the policy process, there could well be significant benefits for policy design and for everyone who is involved in making it and everyone who is affected by it.' (Christiansen, 2016). Building upon this logic, we can congratulate the Ecole de Design Nantes Atlantique (France) and the political

[2] The 27th Region is a french public innovation lab which, starting in 2007, were sending teams of designers together with sociologists and others professionals to public authorities for a limited period of time to carry on experimental and innovative public policy or service re-design.

science institute of Sciences Po Rennes (France) for launching, in September 2024, the very first (as I know of) experimental and joint Master Degree between a design school and political science school to create a 'Design for Policy' Master.

Echoeing Jesper Christiansen's call for closer acquaintance between designers and policymakers, I decided, in an autoethnography logic, nourished by our field experience, to give it a try, and draw what designing policies could look like if we were to take into consideration the two dimensions (policymaking by institutions and designers' way of doing things). Of course, it is highly risky and this is to be regarded as an experimental artefact build to be criticized and for the sake of advancing knowledge and kickstart conversation amongst designers, policymakers, political scientists and whoever is involved or interested by public innovation in general.

4. So, what if policymaking were done a designer's way?

Of course, we're not arguing that designers should replace civil servants to make policies but rather try to draw, to explore, to imagine what it would mean to design policies that would integrate some of the designers' way of solving problems (some even say 'designerly' so as to express the designers' way of thinking and doing). Or in other words, if design thinking gets more and more used for policymaking, how would it fit into the policymaking process? Where would it enter in the process? To what would it contribute?

Before imagining how we could design policies a designers' way, let's have a look at how policies are made today, in theory first, then in practice. Indeed, we will see that there is quite a gap between the two.

So how are policies made? Many researchers, and in particular political scientists, have tried to describe or even picture how policies are or should be made. The most famous policymaking model is undoubtedly the policy cycle of Harold Lasswell dating back in 1956. At that time, he described policymaking through 7 stages (1. Intelligence, 2. Promotion, 3. Prescription, 4. Invocation, 5. Application, 6. Termination, and 7. Appraisal), but this got, later on, reduced and re-organized into 5 key stages which have been regularly reshaped, adjusted, rephrased, etc. But, in general, here are the five main stages of the policy cycle:

1. Setting up the agenda,
2. Policy Formulation,
3. Decision-making,
4. Policy Implementation
5. Policy evaluation.

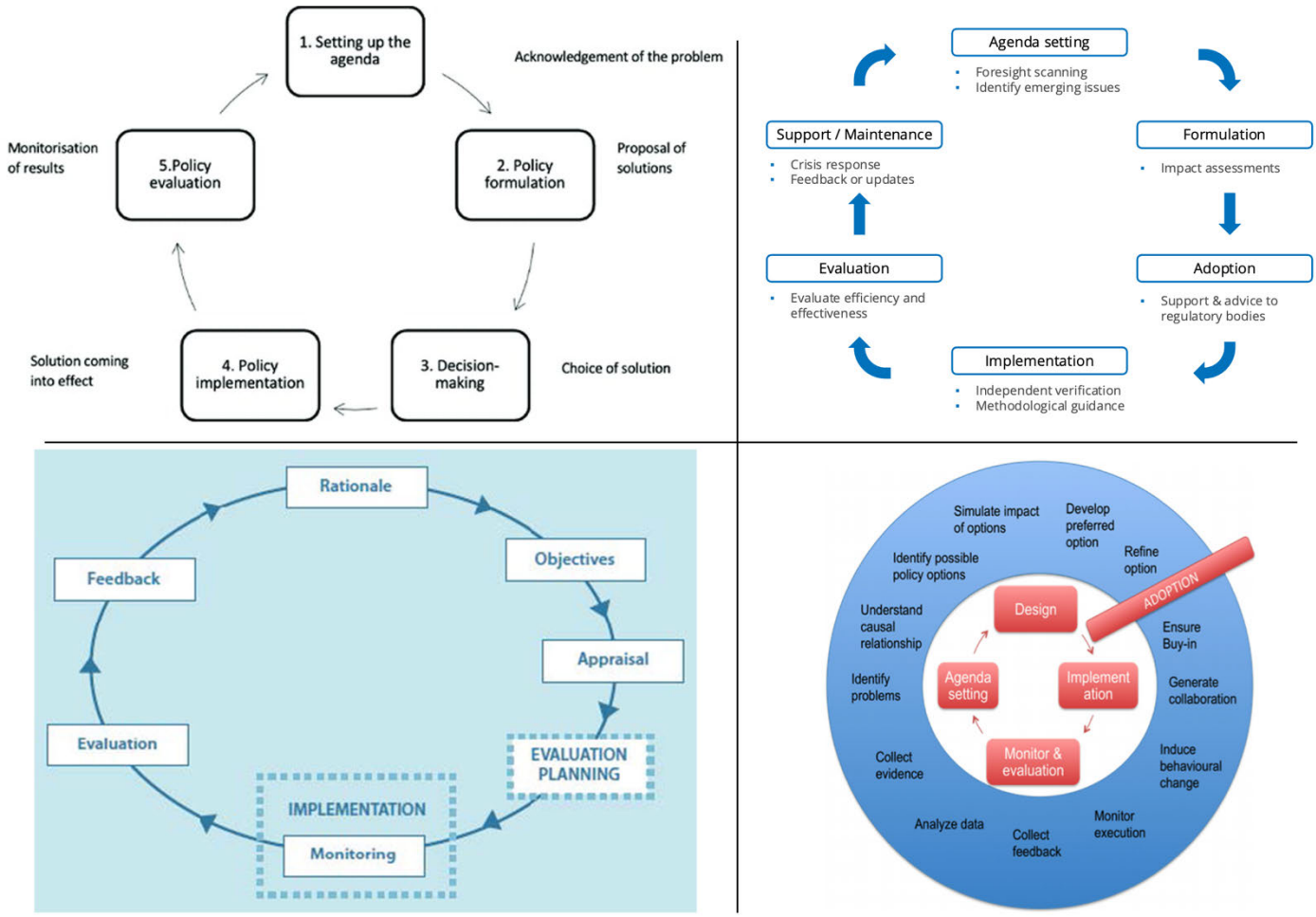

Figure 1-2-3-4. Different variations of the policy making cycle models: Public policy cycle (Lasswell, 1957) (top-left), Policy cycle as found on egu.eu European Geosciences Union (top-right), The ROAMEF cycle of the British Government, adapted from HM Treasury Green Book (2013) (bottom-left), Model elaborated by Stefano Armenia based on Howard (2005) and EC (2009) (bottom-right)

Some variations come up with 6 stages instead of 5, such as the ROAMEF model from the British government in 2022 (bottom left). But regardless of its variations and subtleties, the policymaking process is pictured as a cycle made of sequential stages which end up forming a loop.

This cycle model is clear, straight forward and easy to understand. It's a great tool for pedagogy. However, to some, the policy cycle is missing important dimensions of policymaking as it happens in real life. Indeed, according to John W. Kingdon (1984) policymaking is not integrated, and decision making is also not rational. Several dimensions co-exist together, yet in parallel: problems, policies and politics. For Kingdon, each of these dimensions have a life of their own. Policies are not made in an enclosed pipe, they are subject to interferences, politics on one side, and problems on the other. Problems are not nicely standing static on the side of the road, waiting to be picked up. They are alive (energy poverty, for example, is real, it's tangible and it does not 'wait' for policies), and not only they are impacting people's lives (or ecosystems in the case of pollution for example), they are evolving, even sometimes getting worse. Those 3 dimensions (problems, policies and politics) constitute what Kingdon calls 'streams', which led to the development of an extra approach to policymaking, the one of Muliple Streams Framework

(known as MSF). MSF got very popular in political science since its creation (see figures below) as it highlights the complexity of policymaking.

John Kingdon's Multiple Streams Framework explains that policy changes occur when these three independent streams converge and form a 'policy window' (often due to a focusing event such as the alignment of a standing-by solution with an emerging problem, but also a political change (new government)). Inside these policy windows, streams align, allowing policy entrepreneurs to push their solutions onto the agenda.

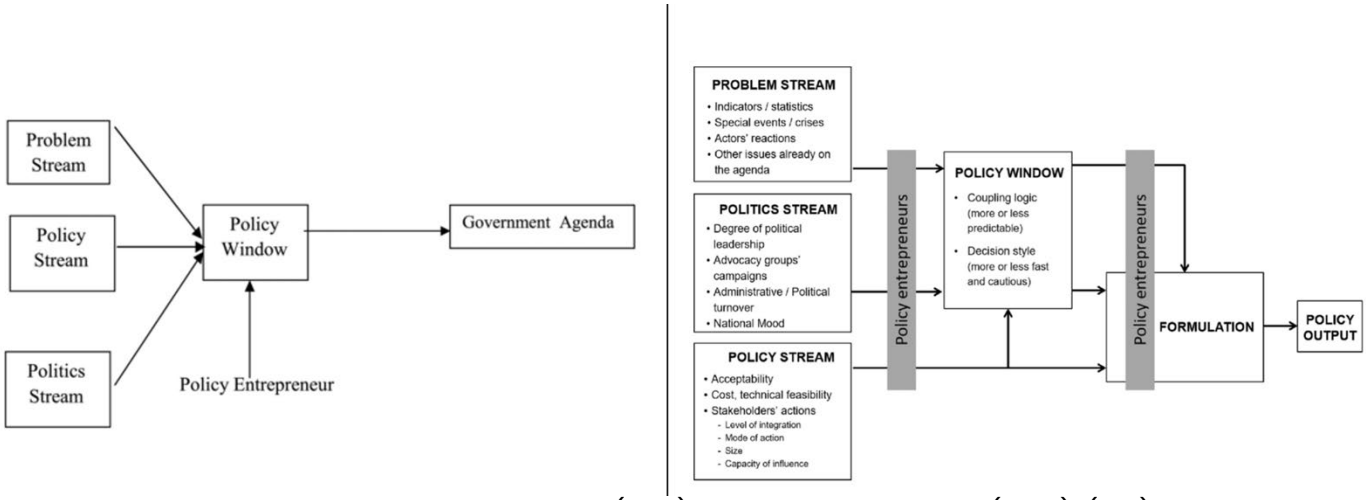

Figure 5-6. The Multiple Stream Framework (MSF) of John W. Kingdon (1955) (left) and Graphical representation of Kingdon's Multiple Streams Theory. Sources: Adapted with permission of Taylor and Francis Group, from Zahariadis (2007) (right)

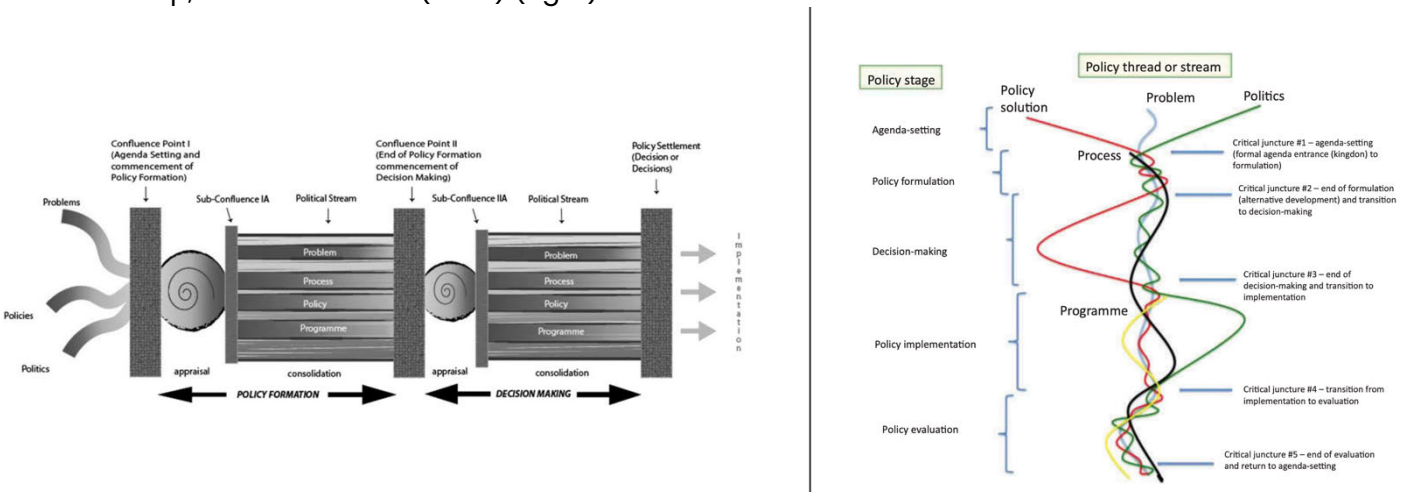

Figure 7-8. The Five Stream confluence model of Howlett, Mcconnell & Perl (2014) (left) and Five-thread (Stream) model of policy process Howlett, Mcconnell & Perl (2015) (right)

In my view, what is interesting in Kingdon's streams model is that it tries to picture policymaking not in an idealistic and theoretical way (like the policy cycle) but rather a more down-to-earth approach taking into consideration how things happen in reality. Since then many political scientists have (seriously) played around with the models and proposed enriched, revised versions (such as the Five stream confluence model of Howlett, Mcconnell & Perl (2014), which brought together Kingdon's multiple stream framework together with the Advocacy Coalition Framework of Paul Sabatier (1998)) and in particular their weaving metaphor (which highlights the fact that the stream (or threads) are not linear but

pulled in different directions based on the multiple (variable and inconsistent) forces at play (government, lobbies, citizens, etc.). But we will not enter further, in this paper, in a tentative review – which I would not be capable to conduct anyway – of all the existing models. What I find interesting is that policy science has tried to draw and describe 'how things work' and designers have also tried to model 'how design works'.

Indeed, whether we look at the 5 steps of design thinking of IDEO or Stanford or the double diamond of the British Design Council, designers have tried to model their process, their way of working. And, just like the policy cycle or policy streams models, the 5 steps model of design thinking or the double diamond model are vastly used in design schools and even more widely in trainings, courses, conferences, etc.

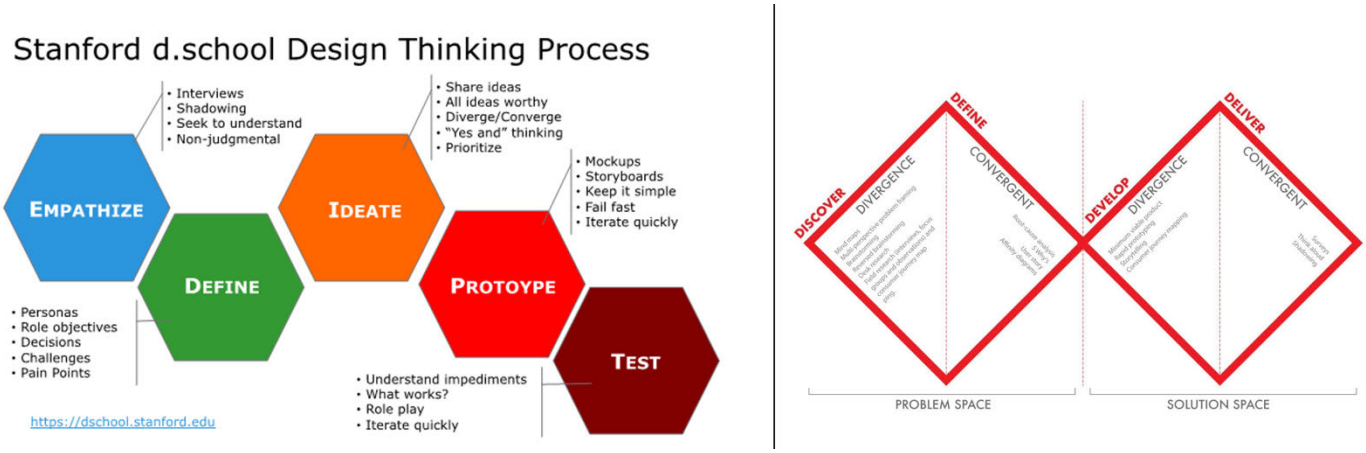

Figure 9-10. The Five step model of design thinking by Stanford d. (left) and the double-diamond model of the Bristish Design Council (right)

While there is certainly some research analyzing the powers of models, what I am most interested in, is the fact that despite their popular use, they all tend to be – to some degree – wrong.

Indeed, policy models, in general, are unrealistic (Hallsworth, 2011). They are not intellectually incorrect but lacking political realism (Howlett, Mcconnell & Perl, 2014). Indeed, none of the models happen in real life (even though I want to point out that the weaving model of Howlett, Mcconnel & Perl is probably the best one to visually depict the 'fluid' or organic nature of policymaking). As Michael Hallsworth highlights it, policymaking does not take place in clear and distinct sequential stages as the models of policy cycles try to reduce it. Policymaking is always made of a mix of existing bits and pieces of programmes and policies, new emerging priorities, windows of opportunities, that are combined and/or at least need to be considered altogether (Delahais, 2024). For instance, policy problems and solutions (when they are not Kingdons' 'pet solutions') tend to emerge at the same time, not nicely one after the other. Governments' decisions, priorities and agendas also do not 'take place in a vacuum' (Hallsworth, 2011), they are subject to all sorts of unexpected events (which sometimes come together and form confluence moments: depicted as the whirlpools in Howlett et al's 5 stream confluence model) including external ones (Sabatier's external events such as changes of socio

economic conditions, changes in subsystem actors). In other words we could say that things are definitely always messier in reality than depicted in policy models. In this regard, Paul Carney's policy 'spirograph' is probably a rather good illustration of the reality of policymaking, yet difficult to use.

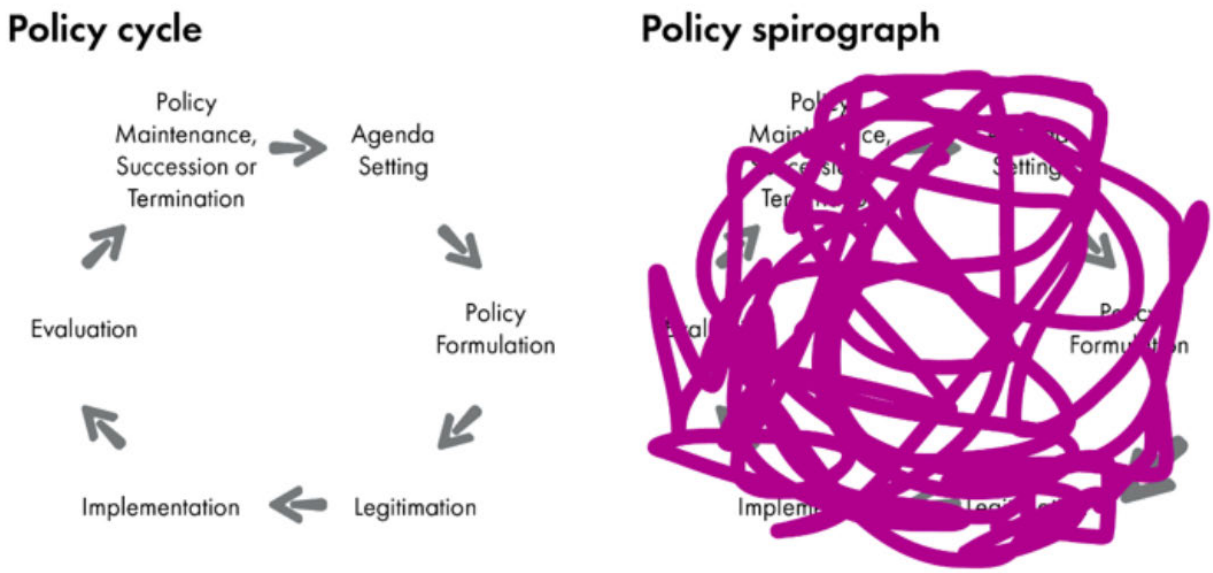

Figure 11. The policy spirograph by Paul Carney (2015)

Policymaking has clearly more to do with bricolage than perfectly well planned engineered manufacturing. And anyone who has worked as a policy practitioner, knows too well that policymaking is definitely more organic (or fluid) than mechanical. And it's not only the case for policymaking but also for design thinking.

My colleague François Jégou (senior designer) and I teach together (in design schools but also in political science schools) and train senior civil servants (at the French National Institute for Territorial Studies) about design and how to apply design in the public sector, and each time we present the 5 steps of the design thinking process, François Jégou keeps telling me: 'what we are showing is wrong, and not only it's wrong but it's also a bit misleading. A designer does not start to have ideas at stage 3 when it's finally time for ideation, he gets ideas when he goes out in the field, when he discusses with users, when he is under the shower'. And it's not only true for ideation. Prototyping usually happens sooner in the process, or at least at the same time as ideation, because designers 'think with their hands', François Jégou says. The design thinking models, just like the policy ones, are misleading as they tend to present things as sequential, and not only it's wrong but it's problematic. Why? Because part of the problem we see with public institution (and their difficulty to make good policymaking) is their rigidity, the fact they tend to 'stick to the plan', to follow an imaginary linear process. And it's difficult, for a (rational-wannabe) policymaker, to accept that while in Phase 3 we might need to go back to Phase 1, or that Phase 4 will take place at the same time as Phase 2 because they feed one another and should advance hand in hand.

So, whether we look at policymaking or at design thinking, in practice (in the real world), we see that they have more to do with a journey than a cycle, or sequence or even steps. It's a journey that sometimes may look straight, but also cyclical,

regularly chaotic, but always evolving, living, changing. It's organic. Considering public policy from the angle of a journey could also enable us to envisage that it is made up of obstacles, options and choices, but also of bifurcations and detours, sometimes deliberate, sometimes not. Improvisation is therefore a key aspect to take into consideration. Using the metaphor of a "journey" would also illustrate the fact that no policy is laid down in advance (despite a vague idea of direction), that no solution is defined in advance, but that they will emerge "along the way". This way of looking at policies may appear a bit radical or disturbing as it proposes to move from a clear paved process, easy to follow and grasp, to a sort of journey, with unclear pathways, and unknown ends…

But this metaphor would actually enable us to draw policymaking in a more realistic and authentic way, but also allow us to incorporate the design approach (as a 'methodology or process') in one hand, and the design posture in the other. Designers are often said to be quite at ease with uncertainty, blurriness, fuzziness. They are not stressed by not knowing where they're going. In fact, they rarely know where they are going, they enjoy wandering and visiting unknown shores. They are also quite fine with following their intuition (building upon what they've seen, the users they've listen to, the impressions they got from spending time on the field). Just like a navigator who would go around and ask questions to both fishermen, but also merchants, travelers, locals before taking the sea but also a sailor watching the clouds, the seagulls and looking for whatever sign he feels might be interesting to catch. Designers easily take creative detours, and remain open to (or even provoke) creative accidents or serendipity. Regularly, the solutions they come up with may seem to be 'coming out of nowhere' or from paths that were not foreseen. Also, they are fine with going backwards, to check on things they might have missed on the field. Combined with their skills to draw, build, model and prototype, they may be a useful add-on crew to have onboard of a wandering policy ship (to echo the sea and ship metaphor of Howlett, Mcconnell and Perl, 2014). Of course, if design can be a useful add-on to equip public authorities with, other disciplines could also help us make better policies such as foresight, human sciences (sociology, behavioural insights, etc.), and evaluation.

5. The Policy Design Journey

As announced, I decided to give it a try and come up with a proposal that would depict the policymaking process as what it is, in my view, meaning a journey, and enrich it with design inputs. In other words identifiy at which moment, of the policy journey, design could contribute, hopefully, in a meaningfull and usefull way. Again, it does not mean that design is the new panacea to policymaking but possibly one of the many useful contributor (or add-on) to new ways of making policies along with its friend-disciplines of foresight, evaluation and behavioral science.

To me, policymaking is an adventurous journey within a vast sea of optional routes and hazards. Therefore, I decided to visualize the journey as a nautical-like chart or navigation map, of course not in a geographical sense but a metaphorical one. And it's important to warn everyone that this Policy Design Journey map is not

meant to reflect how things work right now, in real life, but rather how things could work if we were to better integrate design within policymaking at the same time as to revise the policymaking process itself. So it is not a depiction of the current state of affairs but a wishful view, yet pragmatic – and hopefully credible –, of how policies could be designed. Now that this is made clear, let's dive into the Policy Design Journey in details.

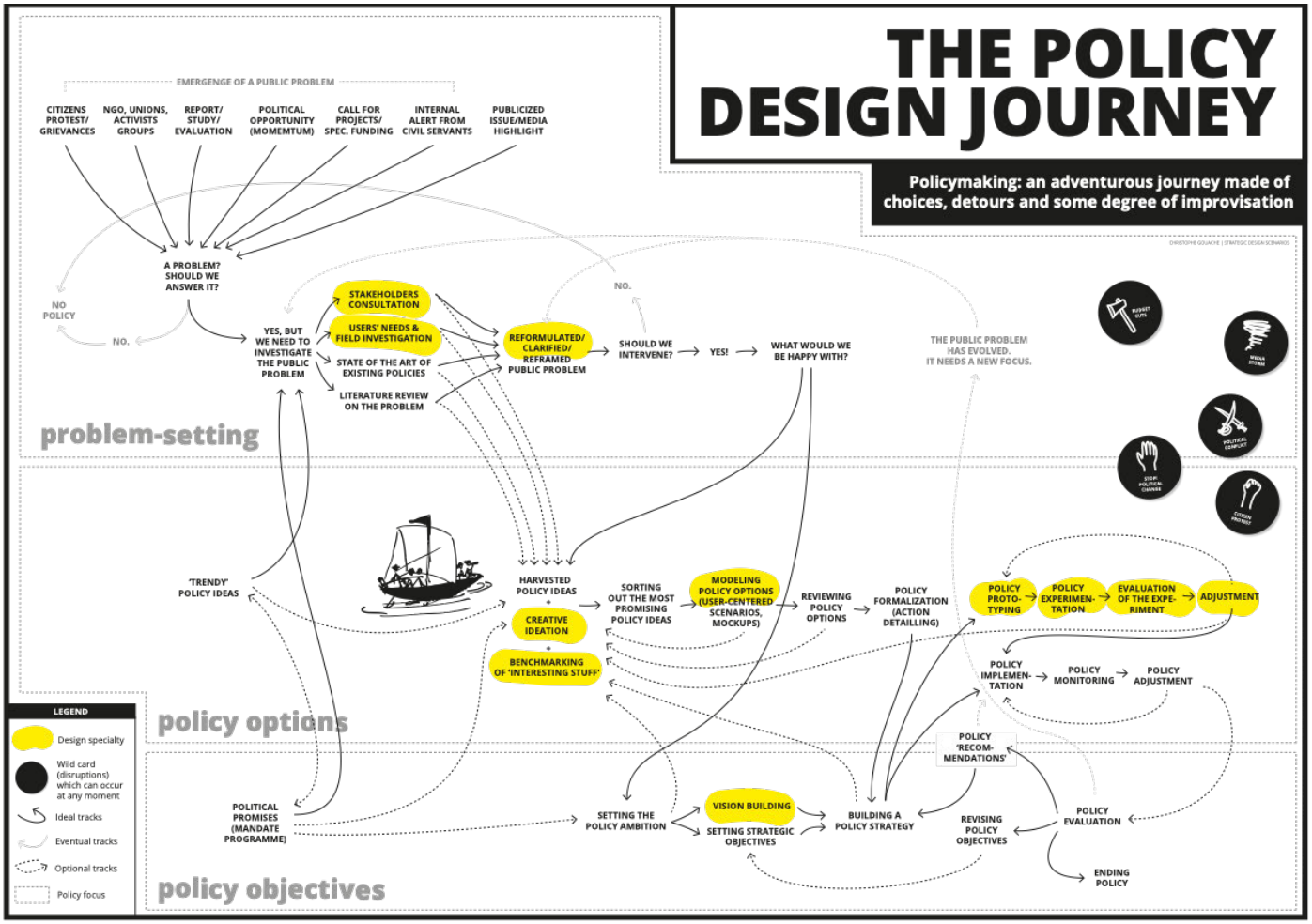

Figure 12. The policy design journey by Christophe Gouache

First, I would like to highlight the underlying layer of the map. Indeed, it has been structured (or arranged) with 3 distinctive zones or areas: the problem-setting, the policy solutions and the policy objectives.

The first one refers to the public problem. Here we build upon two main ideas: the first one being that all policies try to solve a public problem (Knoepfel et al, 2015), the second one that the public actor want and have the possibility to tackle effectively the problem or at least part of it, in other words that practical solutions exist and can be put in place by the public actor – policy solutions – (Neveu, 2017). As Erik Neveu argues, the public problems (which are virtually unlimited) may be popularized by all sorts of actors and claim-makers, therefore the problems that could or should be answered, possibly, by public actors are numerous (and complex) but also in competition with one another.

A public problem might be brought to the political attention in different ways: citizens' protests & grievances (for example an increase of the price of gas), NGOs or activist groups may publicize or reveal a problem that was either overlooked or unknown by the mass (for example chick culling - killing unwanted male chicks which led to new regulation or ban policies in a dozen of countries), report/studies or evaluation (for example the Report of the The Intergovernmental Panel on Climate Change), political opportunity/momentum because of the maturity/favorable context to highlight a particular public problem (for example policies to prevent violence against women), sometimes problem may also be brought by a funding opportunity or call for projects (for example topics such as the 'integration of marginalised communities' pushed under European Regional Development Fund (ERDF)), civil servants may also play a key role by alerting, based on internal technical evidence, their elected officials about ongoing public problems (for example the decreasing quality of local water), and the media (includ. social media) may publicize or highlight real social problems (for example food price inflation) but also, sometimes, highlight anecdotical events or phenomenons which take huge proportions and may lead to the making of specific policy response and regulations (for example the controversy that took place in France in 2016 with the banning of burkinis by a couple of local municipalities, which then sparked international debate and led, in some countries or municipalities, to dedicated policies on the 'burkini problem'). I will not enter further, within the scope of this paper, on the fascinating question of how public problems are formed (or not), considered or ignored, etc. but felt this was important enough to be appearing in our policy design journey as public problems and the way they are proposed to the political agenda is key for our Policy Design Journey.

Regardless of who points out the problem, once it is under the spotlight, a fundamental question needs answering from the public authority: A problem? Ok, we see. But should we answer it? No? Ok, we won't make any policy (as we may consider, for example, that this problem might be someone's else's job to take care of – because of competence, mission or else – or because it's 'not a real problem' or 'not a priority'). If the answer is 'yes, we should do something about this problem' – even though we don't know what yet, the policy journey is initiated. And in our 'ideal' Policy Design Journey (PDJ), this should lead to the investigation of the problem (indeed, in reality and unfortunately, many elected officials skip this step because they claim 'they know the problem' and they might even have the answer to it, 'it's simple all we need to do is to build a wall' (to prevent illegal immigration for example). Yet, it is very unlikely that a public actor can respond to a complex problem if it skips a proper problem-investigation. Why? Because 'to every complex problem, there is an answer that is clear, simple and wrong' reminds us Henry Louis Mencken (American journalist & essayist). Wicked problems cannot be tackled by a simple unique solution. Otherwise they would not be wicked, they would be simple problems.

At this problem analysis moment, design may come at hand by suggesting an immersive investigation on the field, careful listening of its users and a tour of stakeholders, but also, a 'good old state of the art' or evaluation of existing policies on the subject (or close related problem) may prove useful as well as a literature

review of the problem. Indeed, it is very unlikely that a public actor is facing a public problem that no one ever met before (in one way or another). While all of those investigation methods should allow us to better grasp and understand the problem as well as its multiple causes and its effects on people, they may also, at the same time, provide us with policy ideas. Indeed, this goes back to François Jégou's earlier remark: 'when we (designers) go on the field, spend time with the users, listen to the stakeholders, discuss with the workers, ideas come up, on the spot'. This is the same for literature review which can prove to be mines of ideas (yet are often overlooked).

All of this should allow the public actor to get a better grasp of the issue, at the same time as a better understanding of how it should (could) approach the problem (or its sub-factors or causes): that is problem (re)framing or problem (re)formulation. Regularly, policies fail at tackling a problem, not because they are bad policies or wrong actions, but because the problem they try to tackle is not the right one. Or not from the right angle. Setting the angle (or the 'Define' stage of design thinking) of the problem is also something design can help with.

While the public actor investigates about the problem, it may also, at the same time, wonder about its political ambition (or policy objectives) about it: what do we wish? What can we reasonably hope for? Or eventually promise? Potentially, the public problem was even already cited in the political programme for the mandate and this is how it's been brought onto the agenda. The policy objectives background layer (or stream) highlights where political strategic decisions take place. And sometimes, a policy journey does not 'start' from a public problem but the political programme, that's often the case when, for example, a new government takes office. Not all policy journeys start with a problem. Sometimes they start by a political promise or statement during elections.

The policy objectives area (bottom part of the PDJ) is the area in which strategies and visions are built, as well as 'big decisions' regarding the continuing, stopping or revising of a policy or strategy. It's also, mainly, where politics happen (to refer to Kingdon's politics stream).

In a Policy Design Journey, sometimes ideas may come first, meaning aside (or before) problems and politics. Indeed, 'trendy' policy ideas may be politically popular at the moment, either because it's been publicized as a good practice, or maybe because a neighboring government had success implementing such a policy (for example the banning (or restricting) of short-term rental like Airbnb in touristic cities, first publicized by the City of Barcelona then soon copied in other highly touristic cities). In this case, 'trendy' policy ideas may have enough political attention that they mark the beginning of a policy journey. But in this case, ideally again, it should lead back to the problem-setting area for problem clarification and eventual (re)framing, rather than a basic 'copy-pasting' of the policy idea (as context and social realities are necessarily different). An other example of a Policy Design Journey that starts with a 'trendy' policy idea are URBACT Transfer Networks. URBACT Transfer networks are problem-based networks of European cities who come together (for example to work on sustainable food) and work in a close collaborative way for about 2-3 years to transfer the 'good practice' of one city to

all the others. Of course, each EU city, rather than copy-pasting the policy solution of the 'Model City' needs to investigate its own local challenge/problem in order to, later on, come up with its own version of the policy solution.

If we look closely at the policy options area (or stream), we'll also see that design can support the policy process by bringing in, not only its creativity and ideation tools, but also its culture of modeling, mocking up and later on prototyping (Kimbell & Bailey, 2017) and experimenting (in order to crash test a policy before implementing it).

In particular, we can see that the 3 areas (or streams) are not impermeable pipes or isolated canals, but rather areas of a vast sea, meaning that we seamlessly pass from one to another, that we may go back to a previous waypoint, navigate back and forth but also take long detours and new routes, based on windows of opportunities, but also on needs, capacities, time, competencies, and so on.

Finally, the Policy Design Journey is subject to disruptions which may occur at any given moment, which may include: budget cut, political change, political conflict, media storm, citizens protest (and possibly some others). There are no need for examples as we all know, from experience, how a political change of government can stop a policy right away or how a massive citizen demonstration can make a government cancel or stop or modify a policy idea... These disruptions are not only unpredictable but their impact on the Policy Design Journey is also uncertain. Just like a storm, high waves or dangerous wind, the 'captain of the ship' (to cite Howlet's metaphor) may have, whether he/she likes it or not, to change route and adapt.

The Policy Design Journey (PDJ) is not meant to be a handbook or manual for policymaking but rather a tool that could help reflect, organize, plan, consider the multiple options, routes, choices that a team in charge of making a policy may encounter or experience. It could also be useful – eventually – to PSI labs who may, using it, try to draw their desired journey, or consider possible activities that were not planned at first, when working on a new project or topic or public problem. It may also be handy to explain and/or discuss policymaking (that would include a bit of design, but also evaluation) with design and/or political science students.

Finally, I would like to invite practitioners (designers, policymakers, etc.) as well as researchers to 'tear apart' this Policy Design Journey in order to eventually come up with enriched versions of it.

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Chapter 2

REGENERATIVE CITY AND TERRITORIAL DEVELOPMENT

Co-designing benefits for People and Nature

Track leader: Sophie Eberhardt, PhD
City Design Lab director - L'École de design Nantes Atlantique

ethical leadership
a new frontier for design

A Moss-Supported Emotional Regeneration Kit: Posthumanism Speculative Design for More-than-human Sociality and Communities

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RESEARCH BACKGROUND

- The Anthropocene and the value turn in Design.
- Speculative design and multispecies ethnography as a pioneer in reflection.
- Moss as a proxy for natural observation and interaction.

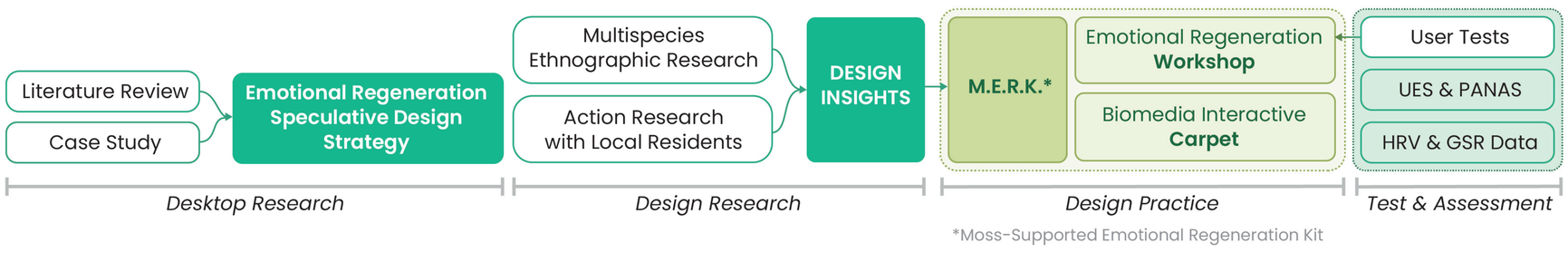
ABSTRACT

Mosses are tiny, non-flowering and rootless plants that are often neglected but crucial to the global and local ecology. They are sometimes defined as the lifeblood of plant ecosystems, not only for their ecological characteristic but also for their contribution: other plants actually benefit from having moss as pioneers and neighbours. The observation of and interaction with these microscopic entities offers a proxy to the nature domains that challenges holistically the perspectives of human-nature interaction (Kimmerer R. W.). The overlook of such a community of nature entities can be seen metaphorically in light of the decayed relationship between humans and nature in the framework of the Anthropocene. On these premises, and leveraging on microscopic community role of these plants, the paper presents an action research that introduces mosses as the agency characters to explore emotional regeneration in the context of community life from a micro and systemic perspective. By presenting a speculative design project, this paper discusses **1) what is the trans-media approach to foster emotional regeneration at the level of urban community and 2) how to integrate speculative design and more-than-human design for inspiring and constructing forms of a cross-species social fabric.** This project involves multispecies ethnography research with the moss and action research with local citizens. At the practice stage, it employs data-driven design and participatory design methods and creates a multi-sensory media experience. Such deep connections between more-than-human agents, designers, and citizens weave a flourishing web of kinship, picturing a clear preferable future of coexistence.

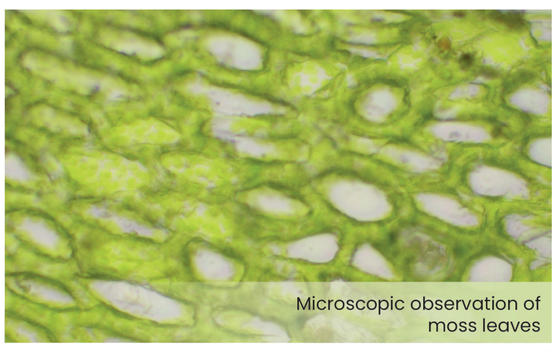
RESEARCH FOCUS

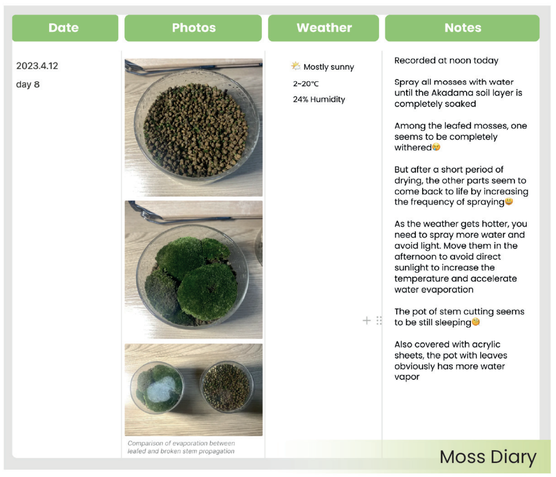
Mosses, as microscopic yet ecologically foundational more-than-human agents, embody a dual significance: their neglect not only mirrors the Anthropocene's imbalanced human-nature dynamics but also metaphorically reflects the marginalized status of individual emotions within societal macro-narratives.

RESEARCH PROCESS



Multispecies Ethnographic Research Outcomes


Microscopic observation of moss leaves



Moss Diary

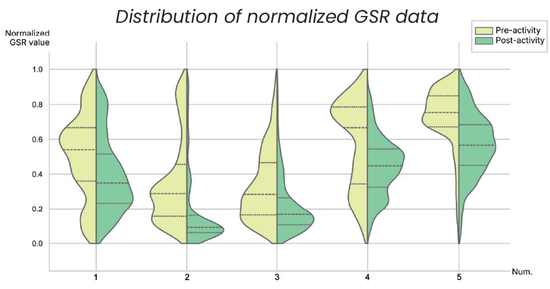
The multispecies ethnographic research includes literature reading, recording moss diary and microscopic observation, providing botanical knowledge and embodied insights.

Action Research Outcomes

The action research arranged an open activity in the target community on Earth Day, and conducted interviews and qualitative analysis.

User Test Result

Distribution of normalized GSR data

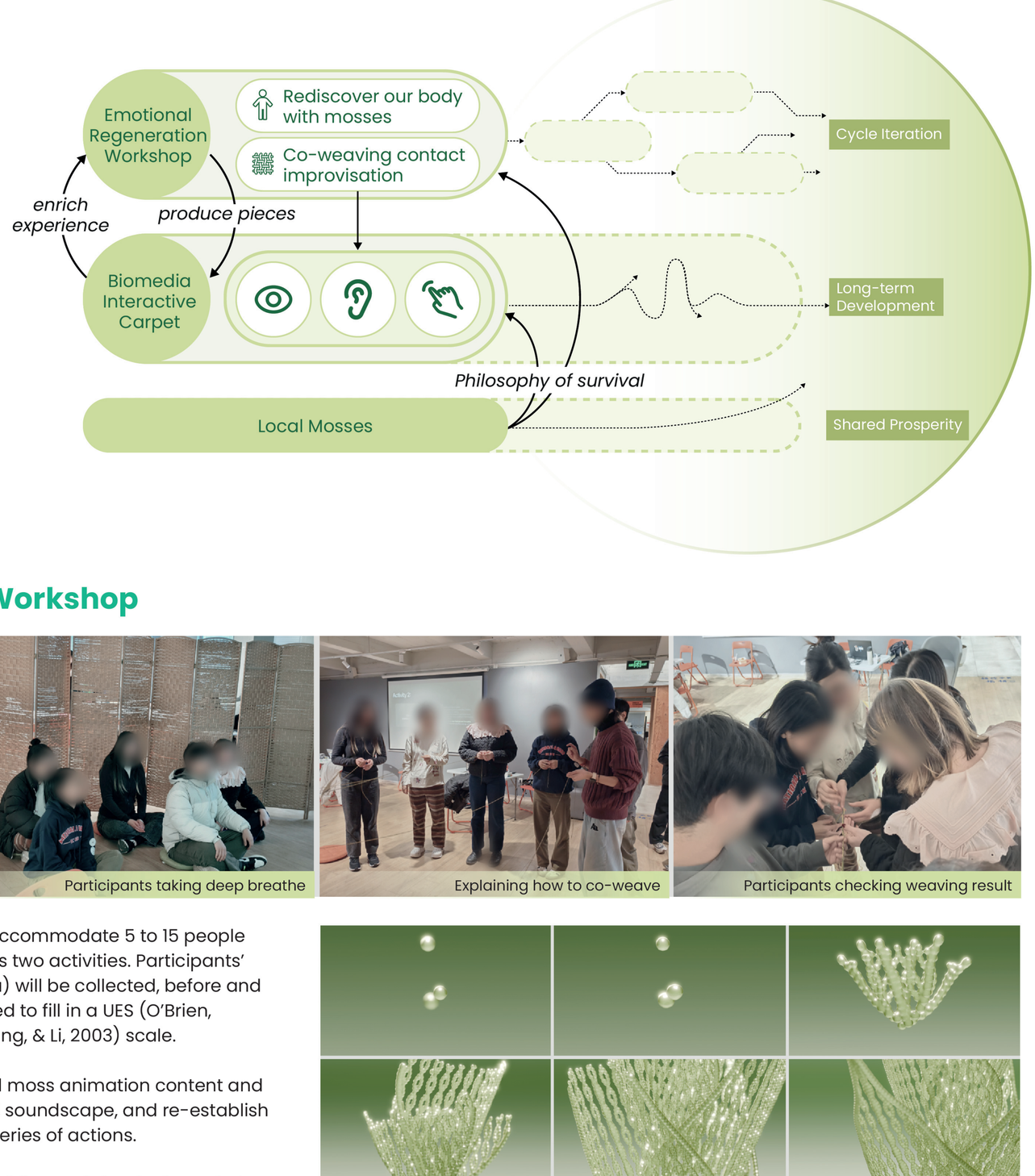


The results showed that the regeneration effect was generally good. Specifically, the scales showed that the activities could promote positive emotions and alleviate negative ones to a certain extent; the physiological data showed a trend of calm recovery, stress relief, and improved physical and mental regulation. **For example, higher GSR levels indicate higher emotional arousal** (Bakker, Pechenizkiy, & Sidorova, 2011). The diagram above shows that participants' normalized GSR values significantly decreased and concentrated, indicating relief and calming.

The Structure of the Moss-Supported Emotional Regeneration Kit

The project is both functional and speculative. In **the workshop**, participants work with their own body, virtual mosses, their teammates and fibers, **fostering emotional regeneration on psychological, ecological, and social levels** (Fredrickson, 2009, Frumkin, 2001, Yang & Li, 2023). **The carpet** combines sounds generated by moss with data-informed fabric design, offering an **empathetic multisensory experience**.

Periodic workshops are participatory, allowing feedback to form **cycle iterations** that better align with the local social fabric. The carpet, **long-term**, is shaped by local moss, offering residents continuous interaction and emotional regeneration, while providing space for future complements, making it a **co-constructed infrastructure**.



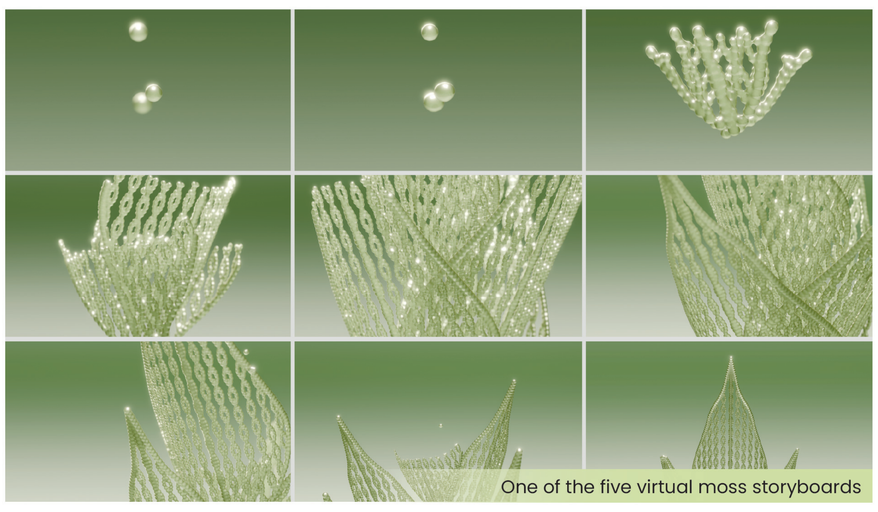
Emotional Regeneration Workshop

Collecting HRV & GSR data
Participants taking deep breathe
Explaining how to co-weave
Participants checking weaving result

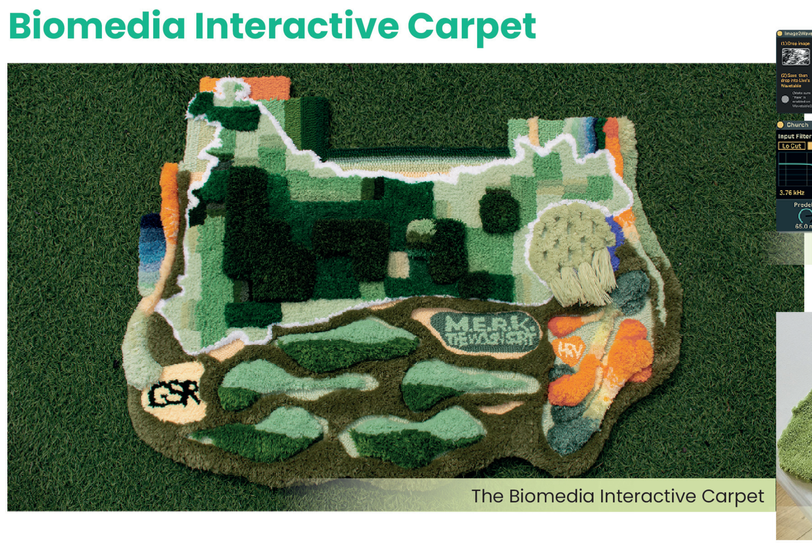
An Emotional Regeneration Workshop can accommodate 5 to 15 people and lasts 40 to 60 minutes. It mainly includes two activities. Participants' physiological data (heartbeat and GSR data) will be collected, before and after the activities, and they will also be asked to fill in a UES (O'Brien, Cairns, & Hall, 2018) and a PANAS (Huang, Yang, & Li, 2003) scale.

In Activity 1, participants will follow the virtual moss animation content and text prompts, relax their minds in the natural soundscape, and re-establish the connection with their bodies through a series of actions.

In Activity 2, participants will work in groups of five and shuttle through the moss-colored wool about 2 meters long, weaving invisible relationships and complexities into tangible fabrics. It is also possible to do this contact improvisation on the Carpet, making sonic media generated by mosses according to their footsteps.

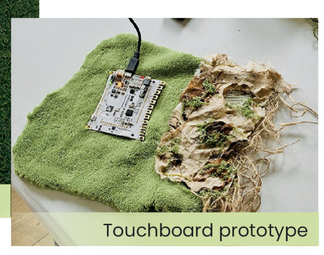

One of the five virtual moss storyboards

Biomedia Interactive Carpet



The Biomedia Interactive Carpet

Ableton Live plug-ins used


Touchboard prototype

The carpet is an interactive data object composed of an abstract NDVI map of the Changning District in Shanghai, as well as data on local mosses and physiological data from community residents, which are then woven together to encompass body, emotion, space, and relationship.

Different blocks are connected to a Touchboard with conductive yarn, which is mapped as a MIDI keyboard in Ableton Live, so that pressing can make sounds. The sound media is converted from image media to sound media by Ableton Live's plug-in, and has been processed by a series of tuning plug-ins.

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A SYSTEMIC, SUSTAINABLE AND TERRITORIAL DYNAMIC CANVAS TO COMBINE ECOLOGY, ECONOMY, AND REGIONAL PLANNING.

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ABSTRACT |

Many actions are being carried out in France to amplify the ecological transition in and with the territories. Some programs help local actors, who often have weak engineering skills, to propose projects to increase the productive nature of their territory. They are supported by urban planning agencies, landscapers, or geographers, and challenged by researchers in transition, innovation, or knowledge management. However, "planning thinking" is sometimes an obstacle to the natural articulation between production (economy), territory (planning) and sustainability (environment). How can we combine territorial planning, ecology, and economy? Designers can be essential to answer this question as they can characterize, mobilize, and federate the actors of a territory to resolve local problems, co-design and test a vision and an action plan, thanks to a systemic and sustainable design approach.

Among the tools used by designers to manipulate the economic variable of a project, we analyzed the Business Model Canvas (BMC) created by Osterwalder in 2004. This tool is widely used in companies to create or challenge an economic model. Initially anchored in a model based on growth, cost optimization and revenue maximization, it has evolved in recent years to integrate social and environmental dimensions, particularly under the impetus of circular design. However, even these evolutions (eg. Sustainable Business Model Canvas) still present several major pitfalls if we wish to resolve a territorial problem:

- Their micro-economic logic, they remain centered on the company rather than on collectives (communities, collectives, networks, etc.).
- The absence of territorialization, for the benefit of an abstract valorization space predisposed to globalization.
- The association of empirical categories (or "building blocks") which do not reflect the advances of practitioners and researchers on the circular economy and associated main schools of thought.

Moreover, Osterwalder's thesis (2004) is marked by the preeminence of a substantialist and ontological perspective, to the detriment of a more adequate representation with flows and processes which would be better suited to the circular economy.

We are experimenting the creation of a more territorialized, dynamic, and resilient canvas as part of a national program to support territories in the ecological transition. This tool would allow the teams in charge of these projects (public authorities, citizens, designers, urban planners, landscapers, architects, developers, etc.) to work on a common systemic and sustainability-oriented object at various scales. This paper will introduce the existing models, share a new canvas and its first tests to articulate ecology, economy and territorial planning for cities and territories transformation.

KEYWORDS | design, territories, ecology, economy, sustainability, territorial planning, regional planning, territorial development, transition, systemic design, circular design, regenerative design, dynamic modeling, business model canvas, bmc, sustainable business model canvas, SBMC, territorialized business model canvas, resilient canvas, systemic sustainable territorial dynamic canvas

1. Introduction.

Territories have always faced planning and attractiveness issues. But climate and biodiversity issues add a new logic that they sometimes struggle to integrate into their vision and action plans. Some national programs support them in defining a strategy or developing projects in favor of the ecological transition. These programs help them in identifying assets, local actants and resources, intraterritorial and interterritorial dynamics and cooperation... and analyzing risks and opportunities. They involve communities, elected representatives, project leaders, residents and supporting structures such as urban planners' agencies, geographers, or designers...

Through the analysis of such territorial planning projects in France, we have identified several key issues. The first one is linked to a major imbalance between planning, economy and sustainability in the analysis and implementation of these projects and their governance. Involved urban planners' agencies or even geographers share a planning vision of the territory. While businesses have above all an economic vision and local communities have expectations linked to territorial development. It gives rise to another major imbalance that disrupts these territorial development projects: a public-private imbalance. It is also difficult for all these actors to think about the entire system and not stay on a microeconomic and local vision of things. They thus have difficulties to understand and align the territory metabolism with the ecologic and economic dimensions.

National programs seek to ensure that the development projects a territory implement

will create (and not destroy) value (economic, social, ecological, etc.). They engage them towards a more productive and sober territory. Thus production, value creation and sobriety are at the heart of territorial issues. However, these territorial planning projects' stakeholders do not necessarily share the same definitions of these concepts which are complex. Moreover, despite their importance in our society and our economy (in France, they represent nearly 80% of economic activities), services remain an unthought in many projects. However, they are complex and multidimensional systems which can give rise to many significant sociological, economic, and environmental impacts.

To ensure that development projects for a territory or more specific area (such as wasteland) consider the aforementioned issues, it is important to help local actors to share a common language and to evaluate the relevance of the proposals with regard to these multiple dimensions. By challenging and realigning projects to increase the productive and sober nature of the territory, they will bring out innovative strategies and action plans based on the potential and limits of the territory and its environment. However, there are no tools completely adapted to these interconnected questions and dimensions. Business modeling tools such as the BMC are limited given their micro-economic, non-territorialized and static nature.

We carried out an exploratory approach to:

- Redefine an updated typology of productive activities that can create value within territories,
- Support and equip public stakeholders in the characterization and self-diagnosis of development projects.

We have worked on a tool for local authorities at the scale of a territorial planning project. This canvas has been inspired by the BMC, but it is based on a more transitional, territorial, and processual matrix.

This work has been experimented as part of the French program "Atelier des Territoires" which is proposed by the General Directorate of Planning, Housing and Nature of the French Ministry of Transition. We have conduced some exploratory interviews and a collaborative workshop. New interviews are planned to improve the model and go further in its transformation towards useful narratives and concrete territorial roadmaps. We therefore present a first version of the territorial and dynamic canvas and its application to one case study. Further testing will be carried out and improvements will be made in the coming months.

This article is organized around 3 parts:

- The first part describes in more details to the context of this explanatory work and the issues we seek to resolve.
- The second part analyzes the notions of production, value creation and sobriety and proposes a typology for "productive activities".
- The third part presents the territorial and dynamic canvas we built and a first application to a French territorial planning project.

In conclusion, we will discuss the learnings of this proposal and we will present the perspectives of our work.

2. Major difficulties in regional planning projects.

A French annual program subsidizes and supports many territories in the definition and

the construction of planning/development projects in favor of the ecological transition. It is organized through participatory workshops to enrich reflection, identify blocking points, and build responses adapted to these territories' real contexts, needs and constraints. Researchers also contribute through food for thought and exploratory research such as the one presented in this article. Among the 6 projects underway this year, let us note for example:

- The redevelopment of an industrial wasteland representing the largest land reserve (and a largely artificialized space) in one of the conurbations of the Nouvelle-Aquitaine region.
- The creation of a new district around a railway station and the creation of a new economic area which should foreshadow the new economic geography of one sub-territory of the Pays de la Loire.
- The development of economic areas radiating beyond the scale a French river, including an industrial-port zone...

In this first part, we detail three key issues we introduced previously: major imbalances within territories, non-consensual concepts with which stakeholders must agree, inadequacy of tools such as the BMC (and the models that inherit from it).

2.1. Major imbalances within territories.

National and local development programs, such as the French program we work with, bring to light fundamental imbalances within territories.

The first one is a significant imbalance between planning, economy, and ecology. This imbalance can be partly explained by the roles, focus, constraints, and levels of maturity of the different stakeholders in these projects:

- Local authorities are focusing on specific issues such of attractiveness, employment, and infrastructure.
- Companies are focusing on business. They seek to maximize their competitiveness and meet the demands of their value chain.
- Planning agencies, urban planners, or design offices are focusing on their operational role with a strong spatial component.

Although the last ones are rooted in economic and social developments questions, they struggle to support cities or agglomerations in their strategic thinking, urban planning approaches and land use planning projects. Taking urban and natural context, regulations, business, and ecological issues into account is difficult. All this leads to a certain misalignment within the triptych planning-economy-ecology.

Another fundamental tension in territorial projects is the imbalance between public and private decisions. It is strongly linked to the distribution of competences usually assigned to the different actors in such a project:

- Local authorities do not have the power or legitimacy to influence business strategies directly.
- Companies base their decisions on specific industrial logics (access to resources, proximity to markets, logistics efficiency) that are often independent of territorial concerns. They face more macroscopic and purely economic considerations which sometimes makes them less receptive to local development priorities.

This imbalance is also amplified by the recurring absence of some stakeholders such as

companies in collective meetings, the possible difficulty to involve some elected officials, the lack of skills in economic development of services or the absence or lack of formalization of a clear vision for sobriety and production on the territory.

There are therefore limits and obstacles to a more strategic coordination to support the redevelopment of territories:

- Influence the location of businesses (e.g. ecopark industrial) through infrastructure, subsidies, or tax benefits ➔ but local authorities lack regulatory instruments.
- The separation of (public) planning decisions from (private) industrial strategies often creates phase shifts ➔ including with environmental objectives or residents' expectations.

To answer these major imbalances, our objective is to identify concepts and models that directly propose theoretical frameworks for integrating economic, territorial, and environmental dimensions into a common vision for both communities and companies. The territorial circular dynamic could provide an interesting framework for co-governance of resources. Such new governance models could, for example, provide a better understanding of the role of different stakeholders in aligning different objectives.

2.2. Non-consensual concepts.

Production, value creation and sobriety are three of the key concepts inherent in this type of projects. However, these concepts are quite vague, sometimes overused and not consensual. This results in a misalignment of stakeholders who struggle not only to agree on the projects objectives but also to assess and challenge their relevance with respect to initial expectations. How can we ensure that a project is suitable for the territory if the evaluation criteria themselves are not shared or poorly understood? Here are some key definitions:

Production:

- According to the French National Institute of Statistics and Economic Studies (INSEE), production is an activity carried out under the control, responsibility and management of an institutional unit that combines labour resources, capital, goods, and services to manufacture goods or provide services. Purely natural processes without human intervention or control are not part of production. According to Mariana Mazzucato, production encompasses the economic and social processes that transform resources into goods and services (Mazzucato, 2013, 2018). She highlights the boundary between what is considered productive and non-productive, pointing out that this distinction is often influenced by economic conventions and political choices.

Value creation:

- In design, the notion of value creation is strongly linked to that of value proposition through a set of products and services creating value for a particular segment of customers (Osterwalder and al., 2014). Value creation is therefore based on the identification and resolution of customer needs or pain, within a viable framework for the provider.
- Value creation, from the perspective of Mariana Mazzucato, is distinct from value exploitation. Value creation involves activities that contribute to the collective well-being and resilience of economic systems, integrating social and environmental dimensions (Mazzucato, 2013, 2018). On the other hand, value

exploitation focuses primarily on financial profit extraction without regard to social or environmental impacts. She calls for a reassessment of value indicators to promote a more inclusive and sustainable economy.

Sobriety:

- A study of the French agency for ecological transition (ADEME) highlights the lack of a single, shared, and precise definition of sobriety (Cezard and Mourad, 2019). According to them, sobriety refers to an approach that aimed at reducing consumption of natural resources and energy while maintaining or improving quality of life. It involves a reflection on the real needs and how to meet them in a sustainable way, with emphasis on efficiency and moderation in the use of resources. Sobriety encourages more environmentally friendly lifestyles and production, integrating practices such as recycling, reuse, and waste reduction.
- Valentin Baudouin explains that sobriety is an old concept (already in use in ancient times) experiencing a renewal (Baudouin, 2019). He opposes it to 'sustainability' understood as green growth. But he also notes that sobriety does not only concern the harvesting and consumption of natural resources. Service activities may indeed also cause harmful effects and pollution.

It therefore seems necessary to redefine the key concepts determining the expectations and evaluation criteria of territorial development projects to support the French program actions. It also appears necessary to re-categorize the so-called "productive activities" to allow a better appropriation of this term and a useful basis to build our tool. Our objective was to obtain a more current and complete compass of these productive activities in relation to the most recent economic theories (circular, functionality…) (see part 3).

2.3. Unsuitable tools: BMC and associated models.

The BMC is a pragmatic tool allowing to question the (current or future) business model of a product or a service offer (Osterwalder, 2004) (Osterwalder and Pigneur, 2010). It is used by large groups or SMEs to redesign an offer or create new offers. It is also used by start-ups or small businesses to assess the economic viability of an idea/an innovation.

It is also regularly used in territorial contexts such as the one we described in this article. Territorial stakeholders describe their project (for example, the creation of a coworking space in the city, the redevelopment of an old wasteland, the relocation of an industry in a deserted area…) and try to analyze the underlying economic model.

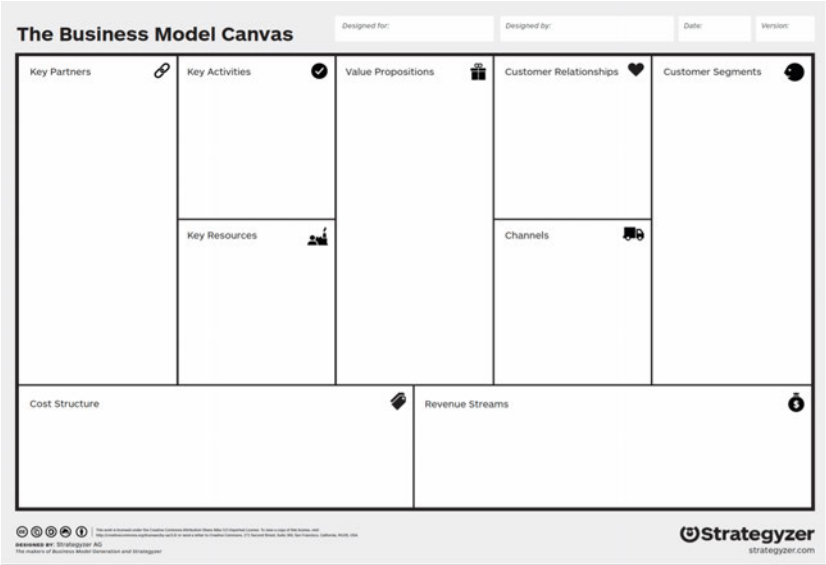

Figure 1. The Business Model Canvas (BMC) proposed by Osterwalder and Pigneur (2010)

The BMC is based on 9 key “building blocks”. The result is a synthetic table that can be manipulated and is easy to disseminate in order to present the offer and to get decision-makers or investors on board. To obtain a favorable decision, it is therefore necessary to present a BMC that is as cost-effective as possible. To do this, questionable design and implementation choices may be necessary to maximize economic performance. Thus, the use of BMC in companies without a systemic and holistic perspective has given rise to many products and services that are not concerned about their negative impacts on society and/or the environment (Bugeaud-Remond, 2023).

But in recent years, this model has inspired the creation of other tools offering more grounded reflections in a socio-environmental logic. Among them:

1. The **Sustainable Business Model Canvas** (available on case-ka’s website) contains two additional building blocks: environmental and social "costs" and "benefits". Such a model may bring out for example energy-intensive or resources-intensive activities, partners using low-paid labor, international logistics with high CO2 emissions... It may also bring out benefits such as employment of people in reintegration, use of renewable energies... Their description requires an adapted decision-making process.

2. The **Sustainable Business Canvas** (proposed by Loïc Bar, founder of Opinum and CoophubEU) is based on the Sustainable Development Goals as described by the UN. It describes the externalities of a product supply or service offer. It also describes what could destroy value, social benefits or even the degree of possible regeneration of the environment. This model supports collective decisions to meet and comply with the SDGs.

3. The **Circular Canvas** (proposed by Circulab) promotes and encourages a systemic perspective. It requires the identification and analysis of all elements of the system under study. It adds to the classic questions of the BMC a reflection about resources that are involved throughout the product or service life cycle (natural, technological, energy), product/service valorization or following use, and (positive or negative) externalities linked to each column of the tool.

Figure 2. Sustainable Business Model Canvas (on the left), Sustainable Model Canvas (in the middle) and Circular Canvas (on the right)

These new models have led to a new and challenging reflection that remains limited in the context of territories planning projects. Indeed, these tools are always very substantialist, ontological and relatively abstract. These projects stakeholders, in particular public actors, need tools for diagnosis, positioning and ideation that are anchored in their territory (its context, vision, heritage...), reflecting and promoting circular dynamics and capable of "playing" between the macro and micro levels of a system at the level of a territory or its sub-territories. Current models are therefore poorly suited to the analysis of a planning/development project in relation to a specific territory from a systemic, holistic, dynamic, and responsible perspective.

3. Exploration of key concepts within territories.

Many stakeholders of the French program have expressed their need to have a 'compass' to better orient and select community-supported economic projects from a productive and sobriety perspective. In this part, we explore the different definitions of production, value creation and sobriety and reposition the notion of 'productive activity'.

2.4. Production and value creation.

The contemporary concept of "production" has now gone beyond the single act of manufacturing material goods to encompass larger and more complex processes. These processes incorporate intangible, social, and environmental aspects. In the face of ecological and social challenges, concepts such as servitization (Baines and al., 2009) (Peillon, 2016), economy of functionality (Buclet, 2005) (Gadrey, 2010) (Du Tertre, 2009), commons, proximity economy, or industrial and territorial ecology reshape the way we understand production from a territorialized perspective.

The concept of value is very regularly lost in favor of the price. Thinking about value-creating activities also disappears and, from there, the question of who creates value and how wealth is distributed. Thus, the value no longer determines the price. But the price determines the "value" of things. This kind of illusion obscures the question of what kind of activities the society might consider important and really productive (e.g. health, education, environment, essential products, security, etc.).

Moreover, the distinction between productive and unproductive activities gradually disappeared to adopt a subjective conception of value determined by the marginal utility of a good or service to a consumer. Therefore, any activity or property for which an individual is willing to pay is considered "value-creating". The consequences are, for example, that services previously considered unproductive are now considered as creating value, once they meet a demand.

Based on the work of Mazzucato (2013, 2018), we have created a summary table illustrating the reclassification of activities according to the new production frontier. It distinguishes productive activities (creating real value for society) and non-productive activities (creating value extraction or destruction, or just surperficial activities).

Table 1. Reclassification of activities according to the new production boundary

PRODUCTIVE ACTIVITIES	NON-PRODUCTIVE ACTIVITIES
Health and education: hospitals, public schools, medical research...	**Financial speculation**: high frequency transactions, speculative "trading"...
Infrastructure: road construction, renewable energy networks, social housing...	**Patent trolling**: accumulation of patents without real innovation to prevent competition...
Useful technological innovation: development of renewable energies, medical technologies...	**False innovation**: gadgets or superficial product updates...
Sustainable industrial production: manufacturing of equipment for the ecological transition, electric vehicles...	**Tax evasion**: transfers of profits to tax havens to avoid contributing to the real economy...
Social and environmental services: forest management, reintegration programs...	**Excessive marketing**: manipulative or superficial advertising...
Basic research: public investments in science...	**Rents**: pharmaceutical monopolies imposing excessive prices...
Circular economy: repair, recycling, sustainable waste management...	**Cost outsourcing**: polluting activities such as extractive industries)...
Commons economy: open-source projects, collaborative production...	**Unnecessary or superfluous services**: excessive luxury or services without social utility (e.g. speculative NFT art sales)...
Cultural and creative industries: significant artistic creation, independent media of public interest...	**Real estate rents**: speculative accumulation of real estate without contribution to the supply of housing...

This table can be used to rethink public policies, to evaluate private investments and finally to reform economic indicators. In France, the INSEE definition of “production” (see part 2.2) hardly considers:

- New and complex forms of governance based on massive cooperation (ecosystems, networks, platforms, communities...) between heterogeneous stakeholders (companies, public actors, associations, citizens, researchers...),
- New forms of value (common property, experience, residential economy, social and solidarity economy...),
- New forms of ”actants” (autonomous technological agents and intelligent systems, collective agents for ecological transition, new entities of the «living»,

etc.) mentioned in the literature by Latour, Descola, Garcia.

To link planning, economy and environment in territorial projects study and implementation, it seems essential to redefine and share the notion of "productive activities". This concept and the resulting reference/questioning tool should also make it possible to improve the transition from project actions to an implementation roadmap involving all the stakeholders in a productive and sober territory logic.

2.5. « Productive activities ».

What we propose to call the "new production models" are very heterogeneous in terms of maturity and origin levels. They are driven by economic theories, territorial and transition concepts such as (non-exhaustive list): circular economy (Stahel, 2019) (McDonough and Braungart, 2002), economy of functionality (Gadrey, 2000, 2010) (Du Tertre, 2009), servitization (Baines and al., 2009)(Peillon, 2016), frugal innovation (Radjou, 2025) economy of the commons (Ostrom, 1990, 2010), industrial and territorial ecology (Buclet, 2021) (Chertow, 2007), industrial symbiosis (e.g. Kalundborj), local economy, ecological transition (Hopkins, 2008), regenerative economy (Raworth, 2017)…

We therefore start from the notion of "productive activity", focusing on new types of productive activities that appear in these theories or models. We have integrated contemporary territorial and spatial theories to enrich our typology by anchoring more production concepts in local, global and landscape dynamics. These complex dynamics need to be integrated and balanced, combining global influences with local specificities and needs, and promoting a harmonious coexistence between economic activities, the environment, and local communities.

This typology includes categories that go beyond traditional production and integrates activities focused on use, experience, commons, and ecological transition. The following is a revised proposal, organized by major axes:

1. **Activities from functional economy and use**: Services "as-a-service" and resource pooling, Energy "as-a-Service" and on-demand distribution.

2. **Activities from experience economy**: experiential and farm tourism, immersive recreation, and culture spaces such as interactive ecological parks…

3. **Activities from circular economy and industrial symbiosis**: recycling and recovery of waste, industrial symbiosis which includes eco-industrial parks, repair and reconditioning of electronic equipment and products to extend their life and reduce waste…

4. **Activities from commons and reciprocity economy**: shared management of natural resources (e.g. community forests and biosphere reserves), local collaborative platforms facilitating the sharing of resources between citizens (eg. object libraries or carpooling tools), green energy cooperatives…

5. **Activities from knowledge economy and high added value services**: innovation and research in sustainable transition (bio-sourced materials, energy storage technologies…), consulting on sustainability and resilience, training, and education in green trades (e.g. permaculture training, waste management…).

6. **Activities from residential and proximity economy**: local shops and basic services (grocery stores, farmers' markets, health, and education services…), social and solidarity economy (home help, care, support for vulnerable people…), short food circuits…

7. **Activities from green production and ecological transition**: production of renewable energies (wind farms, solar farms and biomass), ecological renovation and construction and building renovation to improve energy efficiency, regenerative agriculture and permaculture…

These new types of productive activities are distinguished by their integrative approach, which includes:

- Strong focus on sustainability: activities are designed to minimize environmental impact, often by enhancing local resources and integrating circular practices.
- Use and experience logic: rather than producing to own, the new models value shared use and experience, thus enhancing quality of life and local participation.
- Collaborative and territorialized governance: shared resource management activities and co-operatives promote local governance and community involvement.

This typology could be applied to structure and analyze planning/development projects, allowing to select and evaluate activities (new, strengthened, reduced…) according to their contribution to territories' ecological, economic, and social objectives. They thus will be able to reorient or abandon certain projects in favor of more positive and fair alternatives.

2.6. The territorial metabolism.

To conceptualize these different concepts and discuss their own dynamics, we developed the following diagram:

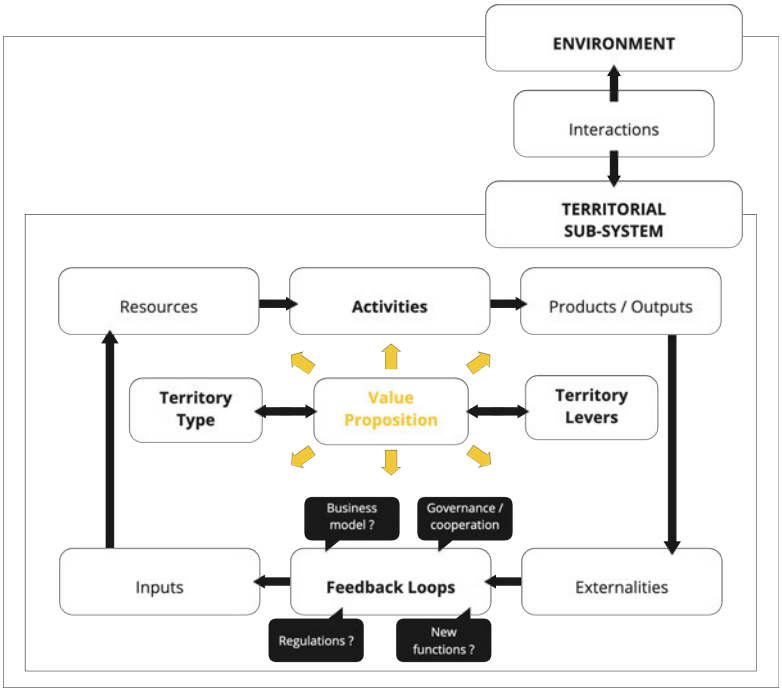

Figure 3. Territorial metabolism diagram

This diagram shows a circular territorial metabolism model in which we can find:

- Significant **activities** (at the heart of the model) or main sectors in the territory (e.g. textile industry, presence of activities related to technological innovation…).
- **Resources** or territorial capabilities that are linked to the territory's heritage (e.g. natural resources, competencies, financial resources, infrastructures…).
- **Inputs** that are necessary for these activities (material, fertilizer, external skills…).
- Products or **outputs** that these activities generate for the territory or not, it could be tangible goods or any other contributions.
- **Externalities** caused by these activities and their outputs. They can be positive or negative for the territory and at more macro scales.
- **Interactions**/exchanges/flow with other territories but also with other activities.
- **Feedback loops** to improve the circularity of the overall system, its productivity and sobriety (new business models, governance and cooperation, regulations, new functions or new uses, new KPIs…).

Once this current territorial metabolism is exposed, the definition of the on-going project **productive and sober value proposition** must be added and tested. It must participate in improving the global system and its internal and external circularity. In addition, it is necessary to analyze:

- The existing or under development **territorial levers** of attractiveness and location such as proximity to a logistics hub, cutting-edge expertise, quality of life…
- The **type of territory** and the coherence between the territory chosen to conduct the feedback and the type of economic model integrating sustainability.

We can then re-loop the analysis by looking at the activities that are concerned by the project value proposition but also the resources, inputs, outputs, externalities, feedback to be implemented… So, we highlight on the model (the first loop result) the elements concerned by the value proposition and its effects on the current system. This dynamic could lead to a kind of strategic causal map to explain the choices made by public and private actors in terms of spatial planning.

4. A systemic canvas to diagnose and realign projects.

This last part presents a first sketch of the Systemic, Sustainable and Territorial Dynamic Canvas (SSTDC) and a case study from the French supporting program. Its contributions and limits have given rise to a collaborative workshop to refine the tool.

4.1. Description of the canvas.

The first draft of the SSTDC is based on the previous territorial metabolism diagram and

on the discussion we had with stakeholders during our recent interviews and workshop. We have presented our research object to the participants of the French program, and we have started a series of 6 interviews to test and refine this model. We then have organized a collaborative workshop during which the projects stakeholders were able to comment and develop together the first draft we made.

This canvas is organized around two main zones, nine blocks, interactions between blocks, interactions between zones, and a global dynamic of the model favoring circularity and questioning. This circularity is expressed in all areas: resources and inputs (local or imported), transformation actions (whatever they may be), output/products causing positive and negative externalities, requiring feedback loops... all being improved or disrupted by the introduction of a new value proposition. In addition, each block is proposed as a set of questions to invite the users to question the block's content but also the circular dynamics of the territorial system in place.

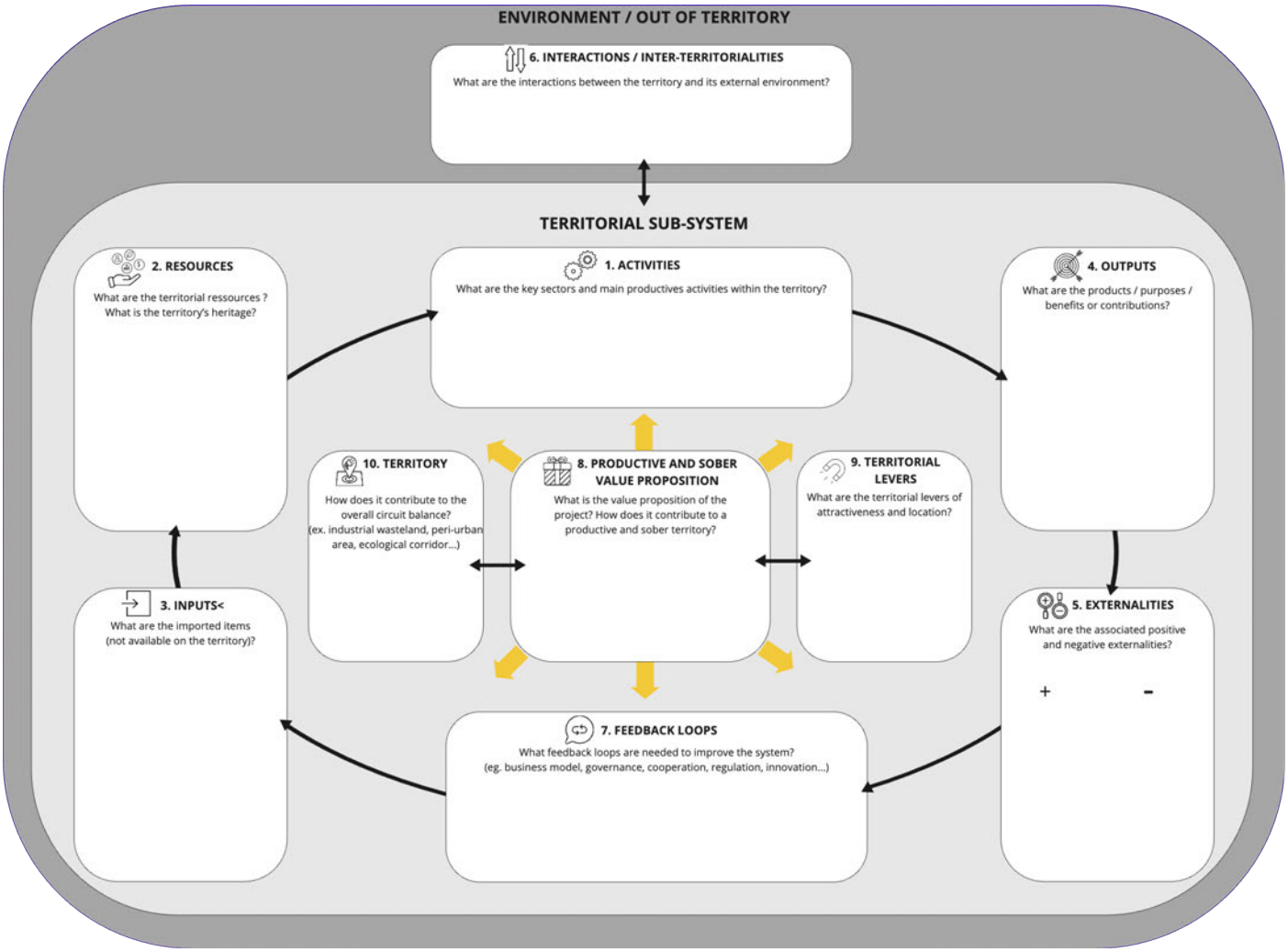

Figure 4. First sketch of a Systemic, Sustainable and Territorial Dynamic Canvas (SSTDC)

Three steps and two loops are required to fill the SSTDC and analyze the interest and impact of a new development/planning project:

Step 1: Describe the current territorial metabolism.

The fist loop is to provide information on the current system:

1. What are the territory or sub-territory key sectors and productive activities?

2. What is the territory heritage and main resources / capabilities (e.g. natural resources, competencies, financial resources, infrastructures…)?
3. What are the required inputs to perform these activities (e.g. material, fertilizer, external skills…)?
4. What are the activities outputs/contributions/benefits?
5. What are the positive or negative externalities caused by these activities and their outputs (political, social, societal, environmental)?
6. What are the main interactions/exchanges with other territories and with other activities?
7. What kinds of feedback loops have been (or are going to be) implemented to improve the circularity of the overall system?

Step 2: Define the development/planning project value proposition and context.

We now have a complete view of the territorial metabolism in place, its opportunities, and limitations. It is then necessary to define:

8. The development project value proposition, paying attention to its productive and sober character: how does the project will contribute to a productive and sober territory?
9. The territorial levers of attractiveness and location: what are the elements (such as proximity to a logistics hub, cutting-edge expertise, quality of life, housing options, key resources access, available services…) that can attract/make businesses and individuals want to come and settle in the area?
10. The current type of territory but also the way it must transform itself to bring coherence between its ambitions, the current or future feedback, and a more sustainable economic model. How does it contribute to the overall system and circuit balance?

Step 3: Test the closure of the project within the territory.

We can start the second loop analysis. We go through all the blocks and their interrelationships to check what the value proposition would improve, add, or disrupt. For examples:

- Creation of a new productive activity? Strengthening or reducing an existing activity?
- Use of additional resources? Regeneration of existing resources?
- Renewal or creation of new outputs?
- Reduction of existing negative externalities or addition of new ones?
- …

Once the key elements have been highlighted, project stakeholders may wonder: is it really useful and productive? does it really improves the existing situation?… They can also modify certain parameters to "play" with the model and refine the project.

4.2. Application to a French rural sub-territory.

We have tested this reference model on five «case studies» from the 6 winners of this year French supporting program “Atelier des Territoires”. One of these case studies is presented below and further tests will be conducted in the coming weeks and months.

This case study concerns a rural sub-territory in the northwest of France. It is particularly characterized by a quality amenity but a decline in the industry and tertiary sectors. The

initial request of the public authorities was about the "land sobriety as an economic opportunity". They specified two main objectives:

- To obtain a shared vision of the future of the sub-territory,
- To reconcile economy and quality of living by taking advantage of local identity and culture.

Two "territorial objects" are concerned:

- The station area for which a tertiary space and mutualizable training offer is envisaged.
- An economic activities zone for which a new, more sober, collaborative, and qualitative format is to emerge.

We have filled the SSTDC with the project management according to the 3 steps and 2 loops presented above:

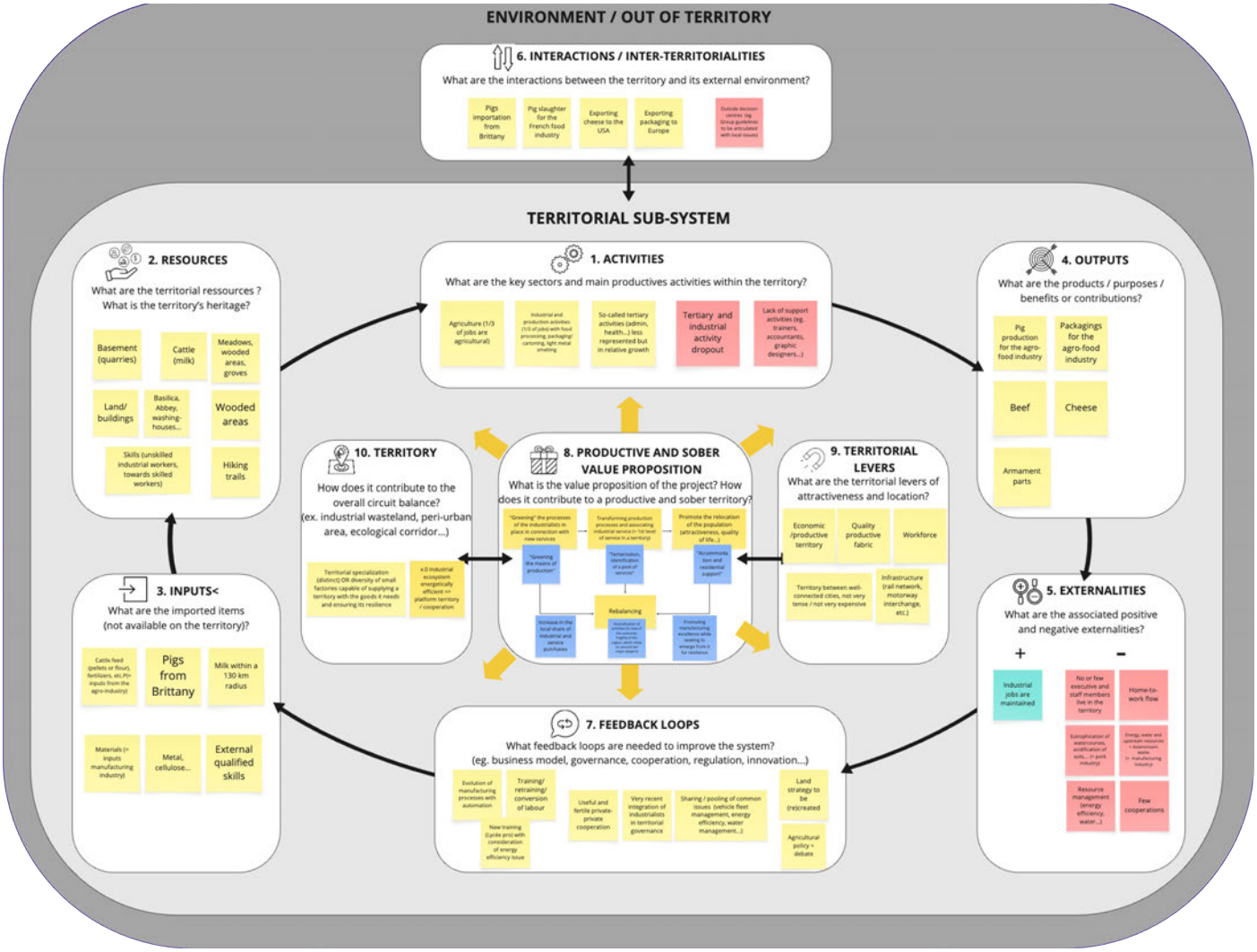

Figure 5. The SSTDC applied to a French rural territory and its green industrialization + services development project.

1. The main **productive activities** of this sub-territory are related to agriculture, industry (food industry, packaging, light metal smelting) and tertiary activities (administration, health) ➔ Two warnings have been noted here: there is a lack of support activities (e.g. training, accounting, graphic design...) and industrial activities are declining.
2. The sub-territory **heritage and resources** are related to basements historic buildings (abbey, basilica...), land, wooded spaces, cattle (for milk) and valuable

skills (mainly unskilled industrial workers).

3. The sub-territory activities require various **inputs** such as pig, cattle feed (inputs from agro-industry) and milk for industrial cheese factories, materials (for manufacturing industry: metal, cellulose…) and qualified skills that are not available locally.
4. These activities produce various **outputs** including cheese, beef and pig production but also packaging for the agro-food industry.
5. These outputs generate several **externalities**:
    - On the positive side - They maintain industrial jobs on the sub-territory.
    - On the negative side - Pork and beef industry contribute to watercourses' eutrophication and soils' acidification. Manufacturing industries consume energy, water, and resources. They also generate downstream waste. Moreover, they require executive and staff members that do not live on site and thus generate commuting.

    ➔ Two warnings were noted here: the lack of resource management (energy efficiency, water…) and the lack of cooperation.
6. Few **interactions** with other activities or other territories have been identified: packaging export to USA and rest of the world, pig slaughter for the food industry, cheese exportation… ➔ Another interesting point concerns the interactions between outside decision centers (administrative headquarters are not here) and local issues.
7. **Feedback loops** are already in operation to compensate for or improve the existing situation: evolution of manufacturing processes with automation, training/conversion of workforce, schools new training with consideration of energy efficiency issue, very recent integration of industrialists in territorial governance, pooling of common issues (vehicle fleet management, energy efficiency, water management…), and land strategy to be (re)created.

Once this current "panorama of the territory" was drawn up, we discussed the development project in progress. The statement of a clear **value proposition** was relatively difficult to achieve considering ongoing discussions within the national program but also the complex governance of the project with a heterogeneous project ownership. The integration of sustainability issues seemed particularly difficult to achieve in favour of a spatial closure of the project. However, space does not always prove to be at the service of a real economic articulation and ecological issues. This is an interesting case study because the canvas allowed them to question the project by performing the 2nd loop to master the overall system and have alignment elements.

Despite the large scale of the program and the still cautious positioning, an interesting value proposition could be built around the following ideas:

- "Greening" the industrial processes and means in connection with new services,
- Transforming production processes and associating industrial service thanks to a tertiarization approach,
- Promote the relocation of the population (attractiveness, quality of life…).

These ideas require a kind of activities rebalancing and diversification. Services could therefore be at the heart of this sub-territory transformation, both to strengthen the performance and competitiveness of existing or future industries (automation, networking, innovative and sustainable design…), but also to support these manufacturers (graphic design, accounting, CSR consultancy…) and accompany their product offers (service innovation). Such an introduction of services is often the starting point for more important transformations (Bugeaud-Remond, 2023), especially through the economy of functionality (Du Tertre, 2009). The combination of

products and services is one of the first levels of maturity in the field of services (figure 6). In addition, the emergence of a servicial logic very often gives rise to new cooperation such as experience sharing or peers coaching, training mutualization or co-management of certain assets...

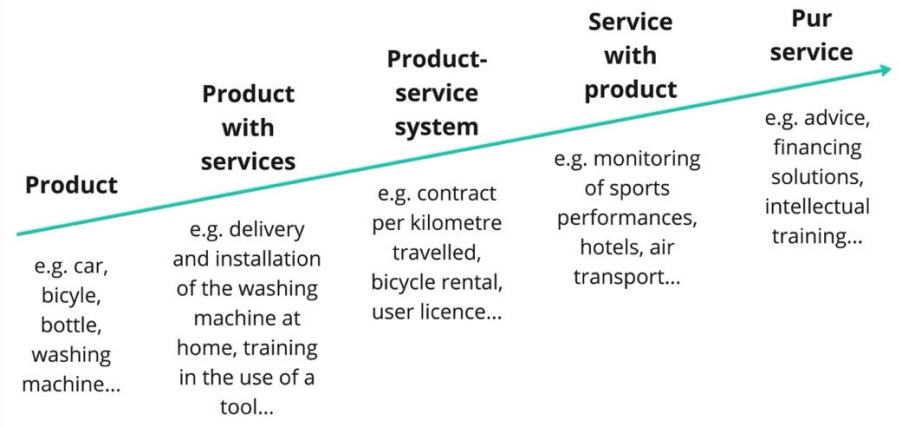

Figure 6. The product-service continuum (Bugeaud-Remond, 2023)

Moreover, we added the **territorial levers** for attractiveness and location as a key building block of the canvas during the workshop with the project stakeholders. This project team put forward the quality of the local productive fabric, the cutting-edge skills and know-how, and the existing and under development infrastructure as key factors to attract new businesses. They also noted the quality of life, good interconnection between areas and the cheapness of housing as interesting levers to attract new skilled workers and their families.

Finally, discussions around such a “servicial” value proposition have brought out a key point about the **type of territory**. The project stakeholders did not characterize the current type of territory but rather they brought out the idea of a networked territory with the question of energy and resource optimization at its center. Territorial specialization or diversification were also discussed during the workshop with this team. They put forward the idea of new activities capable of supplying the territory with the goods it needs and ensuring its resilience. As current production in the sub-territory is not sustainable, it will be important to bring coherence between this sub-territory type, the feedback loops and an economic model that will be both viable and sustainable. The role of “ecosystem” or “territorial platform” will therefore be a central point in the further workshops of this case study.

The case study is still in its infancy and the value proposition, economic model and governance associated with the project and its implementation need to be refined. A new loop will be carried out on the canvas in the coming weeks to verify the adequacy of the refined proposal with its territory. But the SSTDC has allowed them to identify the dynamics, opportunities, and externalities in place and to think constantly "productivity" and "sobriety" whereas this initial request is often set aside in the operational flow of this type of project. They validated the interest of such a shared diagnostic tool to cooperatively challenge projects but also to move towards the famous operational roadmap that they struggle to create so far.

We have more recently worked with them on transforming these models into storytelling, allowing them not only to share their work and the interest of their value proposition for the territory, but also to facilitate the creation of a concrete roadmap. One idea for the future concerns the creation of a complementary tool, such as radar, which would allow a

more quantitative analysis (measurement) to be added to this relatively qualitative analysis (narrative). This tool would help to position the project in relation to major issues and thus analyze its productive and sober character in relation to the concerned territory or sub-territory.

5. Conclusion and perspectives

In conclusion, territorial actors struggle not only to restore a balance between public and private decisions but also to align the economic, ecological, and spatial planning dimensions of these project. People we met have validated the value of the SSTDC to meet these challenges. The teams involved in this type of spatial planning project usually include urban planners or architects. But they also increasingly integrate designers (space, experience, service…) to help them understand the current system and project into a productive and sober future from a systemic and dynamic perspective. Designers use many tools to manipulate the economic dimension of a project and increasingly also its ecological dimension. However, these tools remain limited, little, or no territorialized and dynamic.

Our initial objective was to propose a simple and educational tool for self-diagnosis, contribution and realignment between projects and a territory in a perspective of sobriety and useful, responsible, and sustainable value creation. Drawing inspiration from the BMC, we created and tested a first draft of the SSTDC through two case studies including the one of the rural community discussed in this article.

The planning of the French program in which we conduct our research will allow us to continue the tests. This systemic and sustainable framework will therefore evolve in the coming months towards a more advanced, more pedagogical and even more dynamic model. In addition, this canvas allows a narrative of the territory and the project, promoting documentation and sharing within the territory but also between the territories winners of the French “Atelier des Territoires” program. We will continue our work for the transformation into useful narratives/storytellings and concrete roadmaps. One example can be shared during the CUMULUS conference. However, we think that a complementary and more quantitative tool would allow these actors to move from a project to an actionable roadmap on the 3 dimensions interwoven of the triptych planning-economy-ecology. That is why our next actions will be to organize and animate new workshops with the other 4 winners of the year in the coming months.

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AGONISM/ANTAGONISM. SPORT AND TERRITORIAL REGENERATION THROUGH EXAMPLES OF TOURISM, SOCIABILITY AND MARKETING

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ABSTRACT | Is it still appropriate, in 2025, to talk about regeneration as a possible solution to the pathologies of our metropolises and megalopolis and to focus on the sole dimension of the cities? Are we devoting sufficient attention to the delicate relationship between urban/rural, town/countryside nexus in the search for positive solutions for human life in the post-Anthropocene context? As a partial attempt to respond to these complex questions this paper intends to analyse the spatial and social relationship of sporting activities, with a specific focus on cycling, through key examples of its possible cultural, touristic, economic and communicative ramifications. Focusing on the relationship between the disciplinary sphere of territorial transformation through tourism (Frausto, Ockman, 2005) and sports (Nandasena et al., 2002), the main objectives of this research concern the sociality produced by organised forms of collective interests, the unconventional discovery of places related to sports tourism, and the sustainability of outdoor sports activities. For reasons of space and time, only the specific case study of cycling is presented here, with the awareness that other sports, especially endurance disciplines will subsequently need to be compared for a comprehensive analysis. The paper is structured into four sections: a general introduction, followed by a theoretical framework on the concept of sustainable tourism (Mallen, Adams, 2024), an in-depth analysis of the recent phenomenon of cycling tourism, a factual comparison between the sustainability of Tour de France and the Olympic Games in France in 2024 (Fife, 2008; Faure, 2024), and final conclusions. This paper adopts a qualitative, comparative approach centered on three strategies: (1) interpretive review of literature on tourism and territorial regeneration, with focus on rural contexts; (2) comparative analysis of public data on the 2024 Tour de France and Paris Olympics, emphasizing spatial and symbolic impacts; (3) discursive reflection on sport tourism practices, including cases like "L'Eroica." This methodology supports a place-based reading of territorial change, privileging landscape, temporality, and cultural capital.

It positions the study at the intersection of cultural geography and sport tourism, highlighting spectacle's ephemerality and uneven regenerative outcomes.
The paper critically evaluates two of the most prominent global sporting spectacles held in France in 2024 – the Tour de France and the Paris Olympic Games – probing whether their rhetoric of regeneration effectively translates into durable territorial benefits or remains bound to fleeting accumulations of economic and symbolic capital. These events, despite their contrasting formats and territorial footprints—one dispersed across rural and mountainous regions, the other concentrated in urban infrastructure—offer a unique opportunity to assess the regenerative potential of sport-led tourism and development... Furthermore, by drawing upon analyses from rural theory (Koolhaas, 2020), tourism studies (Aime & Papotti, 2012), and mega-event research (Maennig et al., 2024), it interrogates the role of sport in shaping contemporary landscapes, exposing the limitations of an economy predicated on ephemerality and spectacle.

KEYWORDS | Sport Tourism, Cycling, Tour de France, Olympic Games, Territorial Regeneration

1. Introduction

In the late 19th century, cycling significantly contributed to the discovery of the territories of many European countries, serving as an efficient mode of transportation for covering long distances (Herlihy, 1988). The Bicycle Touring Clubs provided valuable examples of how territorial stewardship intersected with a growing desire for discovery and adventure during leisure time (Horton et al., 2007; Pivato, 2019). Tourism and cycling have grown, fuelled by the same dual romantic and modernist imagination. Far from being a mere background landscape, the territory, especially through the lens of competitive cycling, becomes the embodiment of a modern Homeric mythology (Barthes, 1957), a Cartesian antithesis of the known universe, revealed through the toil of the technological hero.
Cities are not excluded from this popular narrative; however, they serve merely as "stages" in the journey of prestigious races like the Grande Boucle. Instead, the sporting event that most profoundly reinforces and accentuates the perception of the host city is the Olympic Games. Reintroduced as a quadrennial event in the same years in which the Tour was conceived, it transcends mere athletic competition, functioning as a vast socio-political, economic, and cultural enterprise (Richelieu, 2024). This paper, therefore, explores the relationship between urban and rural using amateur cycling and the sports spectacles of the 2024 Paris Olympics and the Tour de France as key case studies. Both events took place within the same country, merely a few weeks apart, thus enabling a comparative analysis of urban and rural tourism investment. The growth of amateur cycling as well as the comparison between two of the three largest sporting events in the world (in terms of media coverage, only the FIFA World Cup surpasses them) fosters a critical reflection on the concrete possibilities of initiating regenerative processes. The study builds on existing analyses (Hammond, 2024) to explore whether the Olympics and Tour serve as a regenerative force or an ephemeral spectacle leaving uncertain legacies.
The available data concerning the two events are partial at the time of writing; however, this very aspect underscores issues of transparency and public interest, which are intrinsically linked to the broader and more critical discourse on new territorial ecologies.

2. Theoretical Frameworks: Tourism and Territorial Regeneration

2.1 Rural tourism as a sustainable resource

Tourism plays a complex and ambivalent role in advancing the United Nations' Sustainable Development Goals (SDGs), acting both as a catalyst for economic growth and a potential threat to environmental and socio-cultural sustainability (Saarinen, 2021). A comprehensive assessment of tourism's contribution to sustainable development requires a place-based approach that considers spatial and contextual specificities (Dewailly, 2011). This perspective is particularly relevant to rural and heritage tourism, where the enhancement of local resources can simultaneously strengthen economic resilience and support environmental conservation (Paniccia, Leoni & Baiocco, 2017). However, the tourism sector often privileges short-term economic returns over long-term sustainability, necessitating a critical evaluation of its impact on local communities and ecosystems (EU Tourism Platform, 2024). Many rural tourism initiatives, therefore, struggle with scalability and adaptability. While certain case studies demonstrate localized success, their high context-dependency limits broader replication.
The "Albergo Diffuso" (scattered hotel) model in Italy, for instance, has proven effective in revitalizing small villages through the adaptive reuse of existing buildings for tourism accommodations. However, its applicability remains constrained by specific local conditions, including historical architectural stock and active community participation, making it difficult to implement in regions lacking these attributes (Di Bernardo, 2014). Moreover, the expansion of tourism, especially in destinations designated as UNESCO World Heritage Sites, poses significant challenges in balancing visitor numbers with the preservation of local communities and cultural authenticity. While UNESCO recognition tends to increase international tourism appeal, it often leads to unintended consequences such as overcrowding, gentrification, and the gradual commodification of cultural heritage (De Simone et al., 2019).
The case of the "Sassi di Matera" (ancient cave dwellings of Matera) exemplifies these issues, as it demonstrates the complexities of maintaining an equilibrium between tourism development and the daily lives of residents. Excessive touristification may result in a loss of historical authenticity, with urban environments becoming artificially tailored to meet visitor expectations rather than preserving their original character (Pedersen, 2002). Sustainable rural tourism has emerged as a response to evolving consumer preferences, particularly among new generations of tourists who seek personalized, high-quality experiences rooted in local cultures. Within this framework, territory regains central importance, with its cultural distinctiveness being recognized as a unique economic resource. However, realizing its full potential requires sustained commitment to territorial regeneration and enhancement (Primi, 2011).

2.2 Travel transformation and local identity

Tourism is shifting from a standardised, mass-market model to a personalised, experience driven approach that emphasizes individual needs and the exploration of lesser-known destinations (Zeqiri, 2024). However, tourism remains an inherently transient activity, often failing to become embedded in the daily life of local communities.
A notable example is the Maui Cultural Lands initiative in Hawaii, where visitors engage in reforestation and archaeological site restoration following the 2023 wildfires, thereby assuming an active role in ecological and cultural regeneration rather than remaining passive tourists (Time, 2023).

Similarly, in Costa Rica, Nayara Tented Camp demonstrates how eco-conscious tourism can contribute to biodiversity conservation. Guests participate in habitat restoration projects, such as tree planting to rehabilitate the sloth population's natural environment, integrating scientific conservation with immersive guest experiences (Condé Nast Traveler, 2024). In Chile, Explora Patagonia National Park adopts regenerative tourism principles, inviting visitors to reforestation programs and ecological education initiatives, ensuring that economic benefits extend beyond luxury tourism into long-term environmental sustainability (Condé Nast Traveler, 2024).

Tourism also functions as a mechanism for understanding the urban-rural dynamic, shaping travel experiences through evolving digital engagement. Initially a written narrative, tourism has transitioned into visual storytelling and digital interactivity, where destinations are curated through images, videos, and user-generated content.

This shift repositions travel, no longer defining the place itself, but rather serving as a backdrop for individual identity and existential positioning (Budiawan & Fedrina, 2024). The place-specific nature of successful projects often prevents the formation of sustainable tourism networks (Richards et al., 2024). By contrast, cycle tourism offers travel experiences that promote minimal environmental impact and a deep connection with the surrounding landscape. It can generate increased local revenues through cyclists' expenditure on accommodation, restaurants, and services, thereby fostering the development of businesses that cater to cycling tourists. It also enhances community engagement and reinforces local identity, as residents take pride in showcasing their region's natural and cultural heritage. Furthermore, it promotes sustainable mobility and reduces dependence on motorised transport, leading to a lower ecological footprint in sensitive areas (Gazzola et al., 2018).

3. The Economic and Cultural Paradoxes of Cycling Tourism

3.1 Mythology and Toponymy significance

The metaphorical and cultural significance of cycling lies in its dual role as both a personal challenge and a collective experience. As a sport, it transcends physical boundaries, transforming landscapes into arenas of endurance and conquest (Vigarello, 2002). Unlike other sports confined to specific playing fields or tracks, cycling ventures into uncharted territory, where the athlete competes not only against rivals but also against the natural and geographical elements. Events such as the Tour de France and Giro d'Italia embody this relationship between sport and territorial identity, turning cyclists into narrative agents of regional pride (Gallagher, 2017). Unlike ticketed sporting events, cycling competitions are freely accessible, allowing spectators to choose their vantage points, effectively inscribing their presence onto the landscape. The fleeting yet profound impact of the race transforms ordinary towns and villages into ephemeral theatres of spectacle, where time momentarily expands, filled with celebrations, anticipation, and ritualistic observation. The symbolic nature of this passage renders certain locations, such as Galibier and Tourmalet, legendary, anchoring them within the collective cycling memory. Even in recent times, professional cycling can reshape the perception of a territory, driven by the ongoing search for new landscapes to explore. In 2025, Rwanda will host the UCI Road World Championships for the first time, marking a historic milestone both for the country and the African continent. Rwanda has positioned itself as a hub for African cycling.
The nation has invested substantially in cycling infrastructure and development programs, with the Tour du Rwanda becoming a prominent race on the UCI calendar.

This event has not only provided local riders with exposure to international competition, but has also attracted global sponsors and teams, further integrating Africa into the broader cycling economy. Rwanda's success in cycling development is closely linked to government initiatives aimed at fostering sports as a tool for economic and social regeneration (Gassmann, 2021). Beyond competition, cycling fosters an immersive relationship between individuals and terrain, influencing consumer trends and brand aspirations. Manufacturers such as Colnago, Cervélo, Specialized, and Bianchi not only equip professionals but also shape the desires of amateur cyclists, reinforcing a culture of emulation. The global market for sports bicycles reached USD 7.0 billion in 2024, with a projected CAGR of 3.2% (2025–2034) (Global Market Insights). Cycling's direct engagement with the environment distinguishes it from other sports, embedding it within local traditions and landscapes, while simultaneously serving as a vehicle for mobility, identity, and tourism (Horton, 2007).

3.2 Economic implications and challenges

Cycling tourism has emerged as a sustainable model for rural economic revitalisation, praised for its low environmental impact, ability to disperse tourists beyond urban hubs, and integration with local heritage economies (Šimková, 2024). Unlike mass tourism, which centralizes economic benefits in urban centres, cycling tourism distributes its impact across broader territorial networks, connecting small towns, cultural landmarks, and rural landscapes (Aragon et al., 2024). However, despite its ecological and economic advantages, its long-term benefits remain inconsistent, exposing challenges in sport-driven territorial regeneration. The economic potential of cycling tourism is evident in several regional initiatives. In Catalonia, Spain, bicycle-friendly policies have contributed to a 17% increase in local commerce since 2022, particularly in protected natural areas (Farías-Torbidoni & Monserrat-Revillo, 2025). In Greece, the Evros region has developed sustainable cycling corridors, integrating trail networks with rural heritage tourism, fostering both environmental conservation and economic viability (Kolkas et.al., 2024). Similarly, in Bali, Indonesia, the Sambangan Eco-Trail has facilitated rural tourism diversification, generating revenue through mountain biking trails while preserving traditional agricultural practices (Sudiana & Rahmawati, 2024). Despite these successes, cycling tourism faces structural limitations. Its episodic and seasonal nature makes consistent revenue generation challenging, while insufficient infrastructure and investment hinder its long-term sustainability (Nguyen, 2024). A recent attempt to address these challenges is the "Il Ciclismo e le Ville Medicee in Toscana" project, a collaboration between the Italian Cycling Federation and academic institutions. This initiative seeks to promote sustainable tourism by developing digital itineraries that showcase the architectural and cultural heritage of the UNESCO-listed Medici Villas, demonstrating cycling tourism's potential in enhancing heritage conservation and economic resilience. Tuscany already had a best practice with "L'Eroica" cycling event in the iconic white gravel roads of the Sienese province. Conceived to celebrate the "heroic" era of cycling, it not only rekindled interest in vintage cycling but also underscored the cultural and historical significance of these unpaved routes. The event's success spurred a renaissance in cycling tourism, attracting enthusiasts worldwide to traverse these historic paths. Building upon this momentum, the professional race "Strade Bianche" was introduced in 2007, further elevating the global profile of the typically Sienese strade bianche (white roads). Collectively, these events have been instrumental in safeguarding these roads from modernization pressures, ensuring their maintenance and integration into the region's tourism infrastructure. As a result, the white gravel roads have transitioned from symbols of rural poverty to celebrated assets of cultural heritage, exemplifying the profound impact of sport in heritage conservation (Salvi, 2025).

4. Sports and the Illusion of Regeneration: Tour de France VS Olympic Games

4.1 The Tour de France: a transient economic engine for rural territories

The Tour de France is not merely a sporting event; it is a national liturgy, a celebration in which France watches itself unfold across its own landscape, recognizing its villages, its roads, its past. The Tour serves as a metaphor for the traveller, who, driven by the spirit of exploration, navigates the unfamiliar while finding reassurance in familiar elements. The race transforms the nation into both stage and spectator, an ever-shifting panorama in which movement and place momentarily converge. As the peloton advances, towns and villages—typically quiet and unremarkable—are briefly elevated to sites of national significance, only to fade back into obscurity once the race moves forward. This transformation is ephemeral; the momentary spectacle vanishes as quickly as it arrives, leaving behind echoes of excitement without lasting change. Meanwhile, spectators remain both stationary and in motion, following the unfolding narrative from afar. Through their gaze, they traverse landscapes that shift between proximity and distance, recognition and elusiveness. If tourism is more than a practice of mobility but an act of territorial transformation (Aime & Papotti, 2012), then competitive cycling exemplifies this dynamic (O'Brien, 2018).

Economic and Infrastructural Investment
The Tour de France generates direct economic benefits, particularly in hospitality, retail, and tourism sectors. In 2023, it generated €4.35 million in economic impacts related to tourism for the Finistère region. The costs for local administrations include the entry fee (up to €3.6 million for the Grand Départ), along with investments in infrastructure, tourism promotion, and logistics, amounting to approximately €3.3 million, of which €2.8 million was covered by local authorities (Adeupa-Synthese-impact-TDF, 2023). However, while Alpine and Pyrenean stages benefit from sustained cycling tourism, smaller towns struggle to capitalise on the event's momentum (Gallagher, 2017). The Grand Départ 2024 of the Tour de France, hosted in Italy, highlighted the significant economic impact of the event. The Italian stages, passing through cities such as Florence and Bologna generated a total economic impact of approximately €17.26 million for the Piedmont region. The Tour brought direct and indirect economic benefits to the region, with visitors spending estimated at over €8.97 million. The influx of spectators was estimated at 75,000 leading to a significant increase in tourism demand and hotel bookings across the region (Rizzi & Sorano, 2025). Cities hosting the Grand Départ experience long-term tourism benefits: in 2019, Brussels welcomed approximately one million visitors during the event, further strengthening its position as an international tourist destination.
According to the Visit Brussels Annual Report, the hospitality sector recorded an increase in occupancy rates, while tourist attractions surpassed five million visitors over the year.

Challenges of Long-Term Tourism Growth
Despite these financial gains, rural municipalities frequently struggle to sustain tourism activity after the race. Many lack the necessary infrastructure and marketing strategies to maintain visitor interest, resulting in short-lived economic gains (Richards, James & Halkier, 2024). While iconic climbs like Mont Ventoux maintain year-round cycling tourism, smaller host towns experience declining visitor numbers once the Tour concludes (Faure, 2024).

Although the Tour does not require stadium construction, it entails significant infrastructure investments. In 2024, €30 million was allocated to road resurfacing and cycling infrastructure improvements, alongside public transport upgrades to accommodate spectators (Ricordel, 2023). However, these investments present financial risks for smaller municipalities, as maintenance costs often outweigh long-term benefits (Chaboche & Faure, 2024).

5. The Paris 2024 Olympics: Infrastructure, Economic Speculation, and Urban Transformation

Unlike the Tour de France, which spreads its impact across multiple regions, the Olympic Games concentrate investments within a single host city, leading to significant transformations in urban infrastructure and governance. The Paris 2024 Olympics have been promoted as a model for urban sustainability, with 95% of the infrastructure being existing or temporary, 100% renewable energy usage, and strategies aimed at reducing carbon emissions by 54.6% compared to previous editions (Paris 2024 Sustainability & Legacy Report Summary, 2024). However, past Olympic experiences suggest that such projects frequently fail to provide long-term value, leaving behind underutilized infrastructure and financial burdens (Maennig et al., 2024). Seine-Saint-Denis, a historically marginalized district, was presented as the primary beneficiary of Olympic-related investments. The Olympic Village, designed to house 14,250 athletes, is set to be converted into 2,800 apartments for approximately 6,000 residents post-Games. Additionally, €1.4 billion was invested in decontaminating the Seine to allow open-water events, an initiative expected to transform the river's environmental status (Doustaly & Zembri-Mary, 2024). Despite these initiatives, several economic concerns persist. Hotel occupancy during the Games reached 80%, lower than previous editions such as London 2012 (90%) and Rio 2016 (94%) (INSEE, 2024). While the Games were expected to attract 15 million visitors, actual numbers were significantly lower, with international tourists making up just 10% of total attendees (Delaplace & Schaffar, 2022). Airbnb rentals surged by 400%, exacerbating an already volatile housing market and driving up rental prices by 40% compared to pre-Olympic levels (Gignon & Delaplace, 2022). The Olympic urbanism model has historically been associated with urban displacement. Beijing 2008 displaced 1.5 million residents, while Rio 2016 forcibly removed over 60,000 people (Wang, 2024). In Paris, Olympic developments accelerated gentrification, particularly in Seine-Saint-Denis, where real estate speculation has already begun affecting long-term housing affordability (INSEE, 2024).

6. Conclusion: The Fragility of Sports Tourism as a Regenerative Force

The broader role of sports tourism – from amateur cycling initiatives to large-scale spectacles – illustrates its potential to foster economic revitalization, cultural engagement, and sustainability. Yet, these outcomes depend on structural planning, local investment, and the integration of sports-driven tourism into broader strategies for sustainable development. Without these elements, sports events risk reinforcing ephemeral economic cycles rather than fostering lasting transformation.

To move beyond short-term economic gains, sports tourism must be reimagined as a long-term regenerative force. This requires policies that balance economic impact, social inclusivity, and environmental sustainability, ensuring that tourism-driven territorial transformation benefits both urban and rural communities in meaningful and enduring ways. Recent industry data reveal a dichotomy between global market instability and local opportunities in cycling tourism.

While brands like Giant report a 20% sales drop and price increases by Trek and Specialized raise concerns, regional contexts suggest resilience. Halfords recorded double-digit sales growth in the UK, and Italy's 2025 Cycle Tourism Forum in Bologna highlighted rising institutional and entrepreneurial interest. These findings suggest that despite systemic tensions, cycling tourism retains strong regenerative potential, especially when grounded in place-based strategies, networked governance, and sustainable practices, rather than dependent on the volatile logics of globalized manufacturing.

In 1957, Roland Barthes was already warning us about the complexity of major sporting events:

> "What is flawed in the Tour is the base, the economic motives, the ultimate profit of the event, generator of ideological alibis. This does not prevent the Tour from being a fascinating national fact, insofar as the epic expresses this fragile moment of History where man, even clumsy, duped, through impure fables, nevertheless foresees in his own way a perfect adequacy between himself, the community and the universe". (Barthes, 1957, p.111)

Figure 1. The 2024 Tour de France route was exceptional, featuring the Grand Départ in Italy for the first time, in the city of Florence, and an unprecedented finish in Nice instead of Paris, as per tradition. This decision stemmed from the impossibility of overlapping the two major sporting events of the year: Paris was already fully prepared for the imminent start of the Olympic Games. © NABA - DRAFT Department of Research and Faculty Training

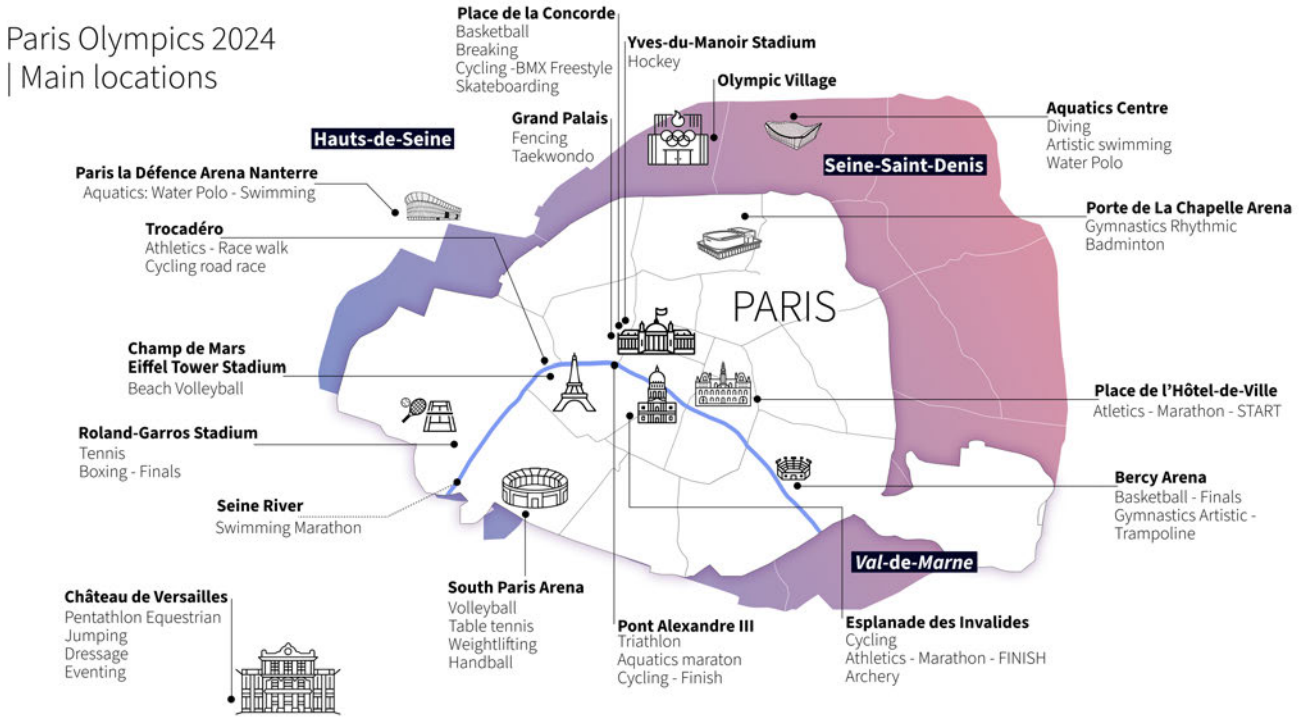

Figure 2. Distribution of the main Olympic venues within the city of Paris and its surrounding areas. The iconic status of the Ville Lumière is enhanced by the decision to transform the city's landmark buildings into temporary venues for the Games. The most exceptional and debated effort is not visible on the map but concerns the city's river infrastructure: the Seine. The water purification process came at an extremely high cost and was not fully completed by the start of the Games, as evidenced by the respiratory difficulties experienced by triathletes who swam in its waters. © NABA - DRAFT Department of Research and Faculty Training

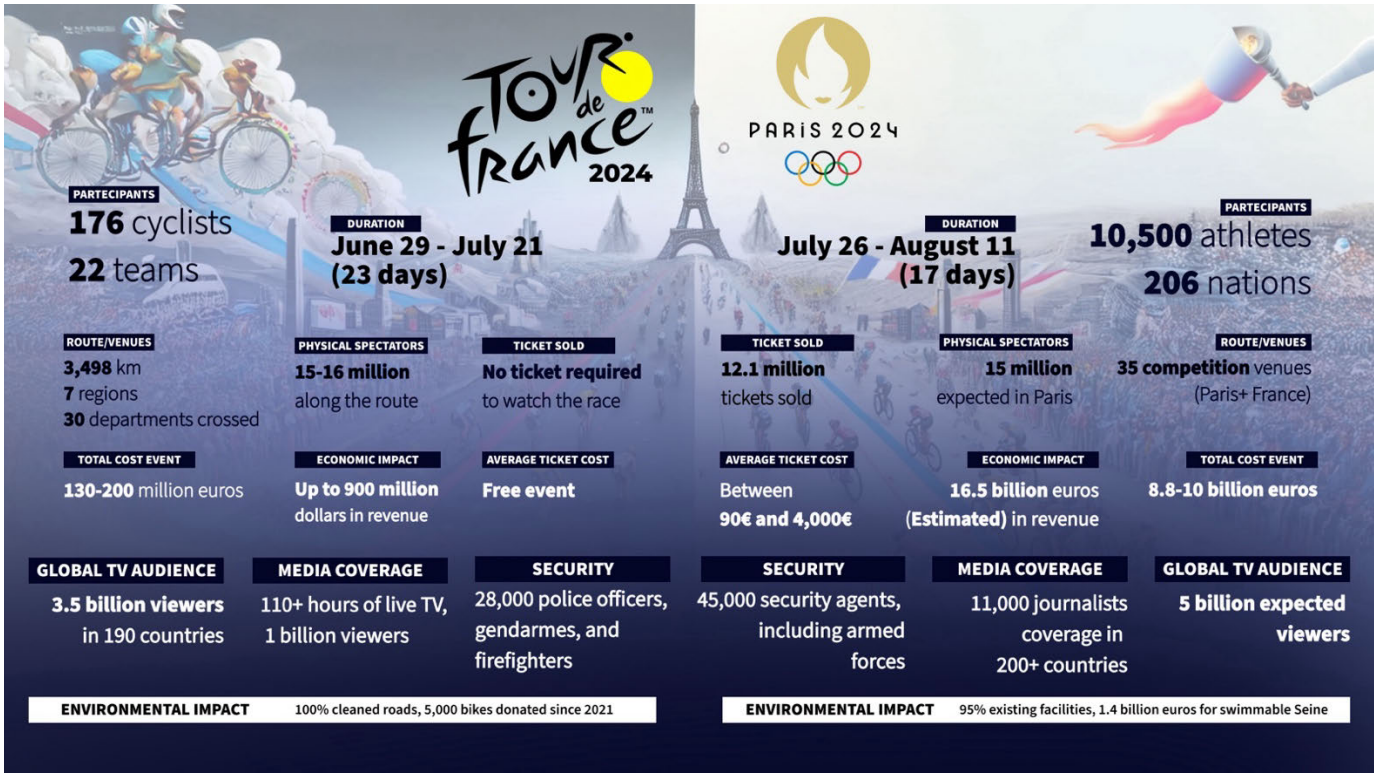

Figure 3. The comparison of data between the two events in question—the 2024 Tour de France and the Olympic Games—is clearly partial and incomplete. This is not due to a lack of time or willingness on the part of the author(s) to complete the research, but rather to a lack of transparency in the available information. Particularly regarding the Tour, the organising company A.S.O. does not make many relevant data publicly accessible for a specialised study on territory and regeneration. © NABA - DRAFT Department of Research and Faculty Training

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ABSTRACT | Recently, creative industry professionals, especially designers, have launched initiatives to develop bio-inspired innovations to reduce the environmental impact of current production and consumption models. Central to these efforts is the research and advancement of bio-based and bio-manufactured materials, providing a sustainable alternative to traditional extractivist economies while promoting local productive autonomy. Acknowledging the growing interest of designers in spearheading and engaging in such initiatives, we compiled a special edition of *Base, Diseño e Innovación* magazine to highlight a range of bio-design projects. This effort aims to increase visibility, foster collaboration on both national and international scales, and strengthen ties with academia, industry, and innovation ecosystems. This submission will address the project's background, outline the editorial proposal, and present the publication in print format.

KEYWORDS | BIODESIGN, BIOMIMICRY, REGENERATIVE INNOVATION, EDITORIAL PROPOSAL

1. Project Background

Over the past decade, designers and creative professionals have developed bio-inspired innovations to minimize the environmental impact of production and consumption. These initiatives apply biological principles to create sustainable materials, products, and services, promoting regenerative design.

Biomimicry, bioinspired design, and biobased design are approaches that take nature as a model, mentor, or measure to solve human problems. Biomimicry imitates biological processes and structures to create sustainable solutions. Bioinspired design draws aesthetic or functional inspiration from natural forms, without necessarily replicating their principles. Biobased design directly uses biological materials or systems. Key figures include Janine Benyus, who popularized biomimicry; the Biomimicry Institute; Neri Oxman, a pioneer in biological design; and studios like Festo and Michael Pawlyn, who apply these principles in architecture and technology.

A key focus has been the development of bio-based and bio-manufactured materials as alternatives to extractivist economies, fostering local autonomy and circular production. Regenerative design is an approach that goes beyond sustainability: it not only seeks to minimize negative impact, but to restore, renew, and revitalize natural and social systems. It is based on the idea that humans can be a positive force in the environment, creating solutions that regenerate ecosystems, strengthen communities, and improve the health of the planet.

Recognizing the growing interest in bio-design approaches, *Base, Diseño e Innovación* magazine published a special edition showcasing various global experiences. The project aimed to increase the visibility of designer-led bio-design initiatives, fostering national and international collaboration with academia, industry, and innovation ecosystems. Aligned with Chile's Policy for the Promotion of Design, this effort also supports cross-sector collaboration and the internationalization of Chilean design.

Base Diseño e Innovación is the academic magazine of the School of Design at Universidad del Desarrollo. Its mission is to highlight the role of design as a catalyst for innovation, driving processes that enhance quality of life and create social, economic, and cultural value. It fosters interdisciplinary academic dialogue, engaging key stakeholders from academia, industry, government, and civil organizations, as well as professionals and scholars from all areas of design. The magazine includes sections such as Perspectives, Cartography, Interviews, Opinion, Showcase, and Degree Projects. Besides, it features a refereed research section accessible through an open OJS platform.

2. Editorial proposal

Andrés Couve—the Chilean first Minister of Science, Technology, Knowledge and Innovation (2018-2022)—claims that when addressing the production and application of knowledge for tackling complex problems an interdisciplinary approach is essential. He

recognises that designers and scientists have different mindsets, methodologies, and disciplinary cultures, which often complicate convergence.

Alejandro Weiss and María José Besoain review the trajectory of the Valdivia Biomaterials Laboratory (Labva), which began in 2017 in an abandoned kitchen. Using a trial-and-error approach that blends curiosity with basic scientific methods, the lab promoted collective learning and collaboration with DIY and Open Hardware biomaterials communities. Later, it embraced virtual communication, strengthening connections across Latin America (Figure 1).

Figure 1. Nurturing a biomaterial movement. Perspectives on biomaterial practice in Latin America based on the experience of Laboratorio de Biomateriales de Valdivia (Labva).

Pilar Bolumburu and Alysia Garmulewicz, from Materiom, argue that advancing biomaterials requires more than technical development; it demands transformation across all stages of production. Hence, a broader network of specialists in different areas is needed to collaborate across the entire chain (Figure 2).

Figure 2. Materiom. Technology, nature, and community for a resilient future

Sofia Duarte and Valentina Rognoli explain that MaDe/Trans promotes a materials design approach to catalyze positive impact, encouraging experimentation with alternative resources, emerging materials, processes, and traditional or enhanced techniques. Their researchers aim to understand natural processes and materials to inspire new processes and applications (Figure 3).

Figure 3. Material design for transition. Practices and materialities for ecological balance and regeneration.

Jimena Alarcón interviews Carmelo di Bartolo, who explains that in bionics, designers use reverse engineering to understand natural systems and identify functional mechanisms for their objects (Figure 4).

Figure 4. Interview with Carmelo Di Bartolo. Bionics and Advanced Design.

In the Showcase section, the architect and visual artist Laura Messing presents Moebio, an initiative developing bio-leathers from organic waste and plant by-products (Figure 5).

Figure 5. Art and nature through Biodesign.

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Care in Urban Design: Reclaiming Identity and Embracing Idleness through the Third Landscape

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ABSTRACT | In contemporary cities, the challenge lies in the diminishing human scale amidst rapid urban development, creating a tension between extensive development and intimate human experiences. This challenge motivated our design studio to focus on the key themes of Environment, Market, and Reuse. Our project took place in neglected spaces beneath the Yanwu Bridge and Bashi area, where a tourist hub, and the local neighborhood intersect in Xiamen, southeastern Fujian province, China. The local neighborhood, affected by recent tourist-driven redevelopment, struggled with a loss of heritage and identity, transitioning from a fishing community to landlords. To reclaim their sense of identity, they repurposed the idle spaces into a unique public realm, distancing themselves from the consumerist spatial character of the two districts. Our studio, employed a methodology that foregrounds film, mapping, and poetic design gestures to reclaim neglected zones. Drawing from theories of placemaking, landscape urbanism, and decolonial spatial practice, the paper offers a critical reflection on how design pedagogy can resist commodified urban development through idleness, unflow, and situated vision.

KEYWORDS | Third landscape, Idle space, Posthumanism, Decolonizing design, Landscape Urbanism

1. Introduction

In 'Materializing Vision: Performing a High-Rise View,' Jacobs et al. (2012) interrogate the modernist legacy of the high-rise as a window technology. Challenging the passive notion of vision, they introduce the concept of view events—a mode of "active seeing" that resists the architectural tradition of privileging distant landmarks over every day urban experience (Göbel, 2015). This redefinition of view finds resonance in the urban sketches of Leon Krier, who championed a city rooted in historical continuity and human-scale complexity as a response to the fragmentation caused by zoning and functionalist planning (Polis, 2012).

This integrated approach is critical at a time when urban design is increasingly reduced to cycles of production and consumption. Our studio situated design inquiry in Xiamen, Fujian province, focusing on idle or underutilized spaces. Drawing from Aelbrecht and Stevens (2019), we examined how these everyday views can become sites for alternative spatial practices.

We explored themes of Environment, Market, and Reuse, focusing on two districts of Shapowei and Bashi with 150 students of Level 4 and 5 at Environmental Design department. Located beneath the Yanwu Bridge and adjacent to a tourist-oriented fish market, these sites mark a stark threshold between local life and commodified development (Franck & Stevens, 2007). Here, tourism-driven planning reinforces economic disparity while marginalizing local fishing communities and their economy.

2. Literature review

This work builds on the theoretical frameworks of view events (Jacobs et al., 2012), everyday urbanism, decolonial design practices (Huybrechts et al., 2022), and landscape theory (Waldheim, 2016). It also references Michael Thompson's *Rubbish Theory* (1979), and Clément's (2004) concept of the *Third Landscape*. These ideas together form the backbone for our critical rethinking of design pedagogy and urban space.

3. Methodology: from view events to situated vision

This research studio employed an integrated methodology that combined mapping, documentary filmmaking, and landscape-based design thinking to critically investigate idle urban spaces and their overlooked narratives. By shifting the focus from iconic landmarks to everyday lived experiences, the studio encouraged students to challenge dominant visual and spatial regimes, particularly those shaped by consumerism and linear urban development.

3.1 View Events as Critical Provocation

We began by introducing the concept of view events (Jacobs et al., 2012), which we integrated into documentary filmmaking (Gedera and Zalipour, 2021) and then controversy mapping (Silberberger, 2021) to prompt our students to re-examine the urbanity of Xiamen, a coastal city in southeastern Fujian Province, China. Rather than privileging static or spectacular imagery, students were tasked with capturing fleeting, embodied, and everyday views—moments of visual tension between the dominant cityscape and the rhythms of daily life. This approach aimed to cultivate a reflexive visual literacy, empowering students to question the urban space (Haas, 2024).

Examining Xiamen from high-rise vantage points revealed a striking contrast between the scale of vertical development and the intimate, human experiences on the ground. Navigating between its tall towers and modest low-rise dwellings exposed the spatial and socio-economic contradictions of the city. These contradictions were not treated as design problems to be solved but as narratives to be unraveled, forming the conceptual basis for reimagining the city through the lens of unflow and

idleness.

The project sites themselves reinforced these contradictions. Located underneath of the Yanwu Bridge, and adjacent to the bustling touristic shopping district of Bashi, these sites are leftover and partially concealed spaces informally used by the local community for recreation. They stand in stark opposition to the hyper-visible, commercialized space of the city, embodying the economic divide between a flourishing tourist economy and the fragile every day and informal economy. The sites ambiguity—simultaneously marginal and meaningful—became fertile ground for design speculation.

3.2 Video Documentary as Design Pedagogy

To help students unlearn inherited modes of seeing, we adopted a video documentary pedagogy (Gedera and Zalipour, 2021), where the camera functioned not as a passive recorder but as an active agent of inquiry. Following Wim Wenders' idea that film can "move people," (Cited in Haas, 2024) students created 3-minute short documentaries to reveal, and narrate lived realities of the site. These films captured the informal uses, temporal rhythms, and affective dimensions of the site, often revealing insights that escaped traditional analysis. The moving image was thus mobilized to situate vision—to see not from above, but from within.

3.3 Mapping as Situated Knowledge

Following the video phase, students conducted a series of mapping workshops, including video mapping, controversy mapping, and psychogeographic drift exercises. Influenced by Donald Schön's (2017) concept of the reflective practitioner and Silberberger's (2021) framework of controversy mapping, these mappings allowed students to visualize complex, entangled layers of urban life—material, emotional, historical, and ecological. Mapping was not used to clarify or categorize, but to expose and complicate, making visible the hidden logics and affective landscapes of the site.

3.4 Landscape as Counter-Narrative

Finally, the studio reframed landscape not as scenery or surface, but as an active, ontological agent. The landscape urbanism acted as a counter-narrative to the spatial governmentality of modernist design, challenging its top-down way of looking at the city and its neglect of the rhythm and complexity of everyday informal life. Drawing from landscape urbanism (Waldheim, 2016), indigenous cosmologies (Grossman & Miguel, 2019; Jon, 2020), and Deleuze and Guattari's (2005) flat ontologies, we encouraged students to explore design as a collaborative process with non-human actors—soil, shadows, water, wind, and architectural decay.

4. The main argument and its application within the design studio context

In *Materializing Vision: Performing a High-Rise View*, Jacobs et al. (2012) interrogate the modernist legacy of the high-rise as a window technology. Challenging the passive notion of vision, they introduce the concept of *view events*—a mode of "active seeing" that resists the architectural tradition of privileging distant landmarks over everyday urban experience (Göbel, 2015, 119). This redefinition of view finds resonance in the urban sketches of Leon Krier, who championed a city rooted in historical continuity, form, and human-scale complexity as a response to the fragmentation caused by zoning and functionalist planning (Polis, 2012). Unlike nostalgic critiques of industrial modernity, these perspectives offer a constructive alternative: a design ethos rooted in the social, spatial, and material continuity of cities.

This integrated approach is critical at a time when urban design is increasingly reduced to cycles of production and consumption, fragmenting the socio-material experience of place. Instead, architecture, urbanism, and landscape must be understood as co-constitutive elements in shaping everyday life. Our studio engaged with these concerns by situating design inquiry in Xiamen, in the southeastern Fujian province of China, where we focused on everyday urban environments, and particularly on idle or underutilized spaces. Drawing from Aelbrecht and Stevens (2019), we examined how these everyday views can become sites for alternative spatial practices—forms of *communing* with land, resources, and the ordinary.

Guided by the themes of *Environment*, *Market*, and *Reuse*, we critically explored the spatio-economic aspect of the Shapowei and Bashi districts and their surroundings. Our sites, located underneath the Yanwu Bridge and adjacent to the tourist-oriented commercial zone of these two districts, mark a stark threshold between local community life and commodified urban development (Franck & Stevens, 2007). Here, urban planning driven by tourism imposes a model of the "common good" that reinforces economic disparity while marginalizing local fishing communities (Franck & Stevens, 2007, 20).

4.1 Methodological Reorientation: From View Events to Situated Vision

Jacobs et al.'s (2012) "view event" posits a bird's-eye, disembodied perspective of the city—abstract and distanced from the social, economic, and emotional realities on the ground. In our studio, we challenged this detachment by introducing a methodology rooted in *placemaking* (Verschaffel, 2021), emphasizing lived experience, human interaction, and local productivity. Working with 150 environmental design students across levels 4 and 5, we employed a pedagogical framework that began with video documentary as a method of situated seeing. The aim was to unlearn inherited visual regimes and replace them with grounded, empathetic engagements with space.

This "video pedagogy" (Gedera and Zalipour, 2021) positioned film not as a representational tool but as an instrument of critical inquiry. Following Wim Wenders' assertion that film can "move people" (Cited in Haas, 2024), the camera served not simply to document but to *participate*, to *listen*, and to *reveal*. As Foucault (1984) might argue, the students' documentaries disrupted the disciplinary order of urban space, unveiling the tensions between built form and lived reality. These videos did not just reflect; they provoked—a counter-narrative to the dominant urban image and a way to access the emotional, and affective layers of placemaking (Verschaffel, 2021).

4.2 Mapping as Situated Knowledge

Following the video phase, students participated in a series of mapping workshops, where the maps were created based on the videos they produced, rather than directly reflecting the city itself. These were not cartographic exercises in the conventional sense but conceptual mappings that synthesized insights from their film work. Techniques such as video mapping, controversy mapping, and psychogeographical mapping were used to make visible the hidden structures, affective intensities, and socio-economic undercurrents of the site.

Drawing from Schön's (2017) anthropology of design education and Siberberger's *Against and For Method* (2021), we understood mapping not as a neutral tool but as a situated, critical practice. *Mapping controversies* became a way to foreground the agency of the site itself—not only as a geographic location but as a co-author of the design process. It invited interdisciplinary analysis of the links between economy, environment, and culture. Rejecting Bruno Latour's emphasis on media debate (2005), our use of mapping focused on local urban dynamics and residents' embodied concerns in the videos.

What emerged was a nuanced understanding of marginalization of the non-human actors amid modern urban development. The site's proximity to the sea and its historical ties to the fishing economy illustrated how local identity was being eroded not through spatial displacement but through the loss of ecological agency (Franck & Stevens, 2007). This was reinforced in mapping exercises that foregrounded marine life, discarded fishing infrastructure, and informal uses of public space.

4.3 Landscape as Counter-Narrative

Our design strategy responded to the failure of architecture and urbanism to adapt to such fragile, complex conditions. Drawing on decolonial perspectives (Huybrechts et al., 2022), we sought to deconstruct the formalist design language imposed by the globalized, tourist-driven urban economy. Inspired by Grossman and Miguel (2019), we considered indigenous cosmologies that prioritize *being with* rather than *acting on* environments. In this cosmology, nature is not an inert backdrop but an active subject deserving spatial and ethical consideration (Jon, 2020).

This reframing allowed us to treat the landscape not as passive surface or visual amenity but as an agent in its own right. Landscape urbanism, in this context, becomes a tool for resisting cultural homogenization and reclaiming site-specific meanings. Waldheim (2016) argues for the potential of landscape to counter the objectivity of modern urban form and instead embrace processes, idleness, and relationality. In aligning with this view, our design proposals moved away from functionality toward a redefinition of productivity—one rooted in care, repair, and co-existence.

4.4 The Poetics of Idleness: Reclaiming Local Identity Through the Design of Unflow

A pressing question around our two districts—shaped by high land value and commercial ambition—is how to meaningfully intervene in a space and resist commodification. The idle areas in these two districts, seemingly unattractive and without function, became central to our design inquiry. It's very lack of flow, productivity, or visibility is what made it powerful.

Idle spaces are commonly dismissed as "ruins" or "fake real estate" (Mariani & Barron, 2014; Socks, 2014), their existence reduced to failure. Yet, from a design pedagogical perspective, these residual sites possess untapped value. They resist utility, elude beautification, and offer a platform to rethink the spatial narratives of cities. We propose that idleness is not emptiness, but a form of resistance—an invitation to design differently.

The next phase of our studio began by framing these spaces through *The Poetics of Idleness: Visualizing Unflow*, positioning it as a lens for reimagining landscape design. This concept shifts the student's attention from solving or activating space to witnessing and representing its absence of flow—its stillness, delay, and drift. Students were asked to see the idle site not as empty but as full of alternate rhythms, micro-residues, overlooked ecologies, and informal inhabitation. This became the foundation of our design pedagogy.

Students first chose a nearby idle or residual space—beneath bridges, beside walls, or between infrastructural gaps. They conducted non-intrusive mappings: recording soundscapes, plant life, wind shifts, micro-trash patterns, and shadow rhythms. These observations were not measured in traditional metrics, but instead formed a multisensory cartography of neglect. Each student produced a layered mapping titled *More Than Empty*, revealing the idle site's latent vitality and informal order.

In alignment with these workshops, we brought in the concept of the Third Landscape (Clément, 2004) as both ecological theory and design method. It challenges the dominance of programmed landscapes by valuing margins, leftovers, and transitional ecologies. our goal was to transform our space into the loosen space, which aligned with the distinctive characteristics of the local neighborhood. This approach challenges rigid economic categories like those imposed by the market.

The Third Landscape does not refer to traditionally designed spaces such as formal gardens, nor to untouched wilderness or protected natural areas. Instead, it occupies the in-between and often-overlooked fragments of the urban environment—those residual, uncultivated spaces that escape rigid control yet are rich in ecological potential. Characterized by spontaneous biodiversity and ecological adaptability, these spaces resist easy categorization. The concept of the Third Landscape invites a radical shift in perception: it calls for the recognition and integration of neglected or residual spaces as essential components of urban planning and design. By allowing non-human actors to flourish without predetermined function or aesthetic, the Third Landscape challenges normative ideals of beauty, utility, and value in design discourse (Clément, n.d.; Luogo, n.d.).

In our design studio, we employed the Third Landscape metaphor not only ecologically but also

poetically—as a conceptual realm where latent events gather and emerge unpredictably, echoing the unconscious layers of our shared spatial experience (Clément, 2004; Luogo, n.d.). Through this lens, the Third Landscape became both the subject and the method of inquiry, enabling students to challenge dominant narratives and contribute to more inclusive and responsive urban imaginaries.

5. An Examples of Visualizing Unflow: The Dry Stream as Design Gesture

Each student's proposal led to a distinct prototype and case study for the final design. For example, one prototype draws from Chinese and Japanese garden traditions—a dry stream, not as a literal watercourse, but as a spatial metaphor. A dry stream traces the absence of water: a composed void, a silent movement, a memory of flow. This idea resonated with our central theme of unflow—movement without velocity, presence through absence.

The final design challenge centered on composing a Third Landscape Garden—not a garden in the conventional sense, but an assemblage that embraces neglect, informality, slowness, and temporality. The idle site, long overlooked and misused, was transformed not through construction, but through sensitivity. Guided by cultural theory and speculative spatial practice, the student reimagined this residual space as a living composition, rooted in attentiveness and open-endedness.

In response to studio discussions around Bruno Latour's Actor-Network Theory (2005), Michael Thompson's Rubbish Theory(1979), and Georg Simmel's (1998) reflections on the autonomy of ruins, the student sought to reinterpret the site's cultural traditions through the lens of Gilles Clément's Third Landscape strategy (2004). Her controversy mapping process led her to conceptualize a bamboo installation—tree trunks placed beside the site—creating an informal public node for lingering, disconnected from consumption. This gesture linked the street level with the site, where a quiet redesign proposed an *event landscape*, rooted in poetic ecology rather than formal urbanism.

The transformation relied on three key spatial strategies:

- A dry stream gesture, drawn from Chinese and Japanese garden traditions, signifying unflow, pause, or gentle division—not a literal stream, but a spatial metaphor;
- The use of found fragments—bamboo, trash, weeds, broken objects, and shadows—collected from the site and re-situated within the landscape as material memory;
- A single invitational element, such as a perch, a glimmer, or a subtle acoustic signal, offering a moment of shelter or encounter for human and non-human life alike.

This design approach reframed the underneath as a Third Landscape—a space co-produced by human and non-human actors, resistant to fixity, and alive with ecological agency. The dry stream bed, for instance, was designed to receive seasonal rainwater and seeds carried by sea winds, allowing spontaneous vegetation to grow and morph the form of the space over time. In doing so, the student echoed Massey's notion of place as "thrown-together" (2005, as cited in Stevens & Dovey, 2023), emphasizing that places are shaped by multiple temporalities, actors, and trajectories—not only by human intention.

Importantly, the student's intervention restored cultural memory, referencing the lost traditions of local fishermen, while also drawing from the spatial language of classical Chinese gardens. Yet, the design intentionally avoided nostalgia or monumentality. Instead, it proposed a garden of refusal (Jon, 2020)—a counter-practice of waiting, watching, and lightly intervening, where time is allowed to move differently and meaning arises not through planning, but through openness.

Through this strategy, the role of the designer shifted from that of maker to enabler, facilitating rather than dictating spatial outcomes. Designs were expected to remain flexible, shaped by weather, occupation, decay, and growth. This aligns with recent shifts in spatial theory and practice, which suggest that innovation in public space does not emerge from new formal typologies alone, but through new actors, temporalities, and cultural recognitions. The looseness beneath the bridge thus became a

site of possibility—a poetic ecology where incompleteness, informality, and unflow are not problems to be solved, but values to be cultivated.

6. Conclusion

This studio offers a compelling case for how architectural pedagogy can challenge dominant paradigms of productivity, instrumentality, and intervention by embracing idleness, unflow, and situated vision. Rather than seeing idle spaces as failures, students reimagined them as latent territories of possibility—zones where other ways of living, sensing, and designing could emerge. Working within two shopping districts in Xiamen, they learned to resist the urge to fill, fix, or finalize. Instead, they developed strategies of attention, slowness, and co-existence that positioned the site not as a blank slate, but as a complex, living system—full of memory, material fragments, and untapped ecological potential.

This reorientation was not purely spatial; it was also ontological. Drawing on Deleuze and Guattari's (2005) notion of becoming, and inspired by Gilles Clément's Third Landscape (2004), the students explored how idle spaces could give rise to forms of subjectivity beyond the human. In this reframing, agency was extended to non-human actors—plants, shadows, trash, weather, decay—and the act of design became less about authorship and more about hosting emergence. The idle site thus became a stage for multiplicity, transformation, and becoming-other (Deleuze and Guattari, 2005). Through gestures like dry stream installations and ephemeral garden compositions, students engaged in a form of ontological design that challenged established values of order, function, and aesthetic cleanliness.

Theory in this studio was never a prerequisite or a distant lens. It was born of necessity. Each phase of student work demanded a theoretical anchor—one that could amplify what they had intuitively uncovered through drawing, building, and mapping. Whether through notion of "leaving blank" (Zhang, 2022, 35), O'Connor (2018, 15), "liberal carelessness," or De Sola-Morales (1995), advocacy for the weak and residual, theory became a stepping stone from one phase of design to the next. Rather than dictating design, it followed and deepened it. This reciprocal relationship between theory and making is emblematic of research by design: knowledge generated not before action, but through and because of it.

In embracing dry streams from historical Chinese and Japanese gardens, students designed with seasonal openness—creating porous, shapeless morphologies that welcomed seeds, water, animals, and local rituals. These interventions were neither prescriptive nor ornamental. Bamboo poles, repurposed from the seafood-drying tradition, were used not for their functionality but for their ability to evoke site-specific memory. Such gestures resisted commodification, instead proposing a scenographic, ethical, and cultural contribution to the neighborhood. The goal was not beautification, but attunement—a slow and careful noticing of what already exists, what is emerging, and what could be nurtured in time.

This pedagogical approach also challenged hierarchies within the classroom. As the design process unfolded, teaching itself became more responsive, improvisational, and dialogical (Freire, 1970). The studio's emphasis on experimentation and informal exploration meant that instructors were not simply delivering content but co-producing knowledge with students. Each design was treated as a small research experiment, calling forth tailored theoretical tools, critical discussion, and peer reflection. Students were not only designing spaces; they were actively testing pedagogical frameworks and developing their own design philosophies—an exemplary model of student-led, research-informed education.

Ultimately, this studio foregrounds a different kind of design knowledge—one rooted in care, attentiveness, and poetic resistance. It does not aspire to fix the city, but to reinhabit it differently. It does not romanticize idleness, but situates it as a condition for ethical engagement, ecological resonance, and cultural renewal. It reframes landscape urbanism as a discipline that does not just build things, but makes sense of the world, and in doing so, opens new pathways for coexistence, memory, and imagination.

In a time when urban development is increasingly driven by metrics, spectacle, and erasure, the reclaiming of idle spaces through the poetics of unflow offers a quiet, radical alternative—one that honors the fragments, the weeds, the shadows, and the people who linger. It is through these acts of spatial and conceptual care that a truly inclusive, grounded, and generative design can begin.

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Communicating Urban Perception: Digital Tools to Inform Urban Regeneration Initiatives

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ABSTRACT

Despite much research on mapping urban perception, such data is rarely used to inform urban regeneration initiatives. Moreover, literature on the subject is mostly focused on data gathering and analysis, with few studies on how to communicate this data to relevant stakeholders. By developing tools to understand people's perception of the urban environment, Design can play a major role in promoting cities' shaping and transformation, thereby linking public authorities and urban planners with citizens.

Research objective: the poster presents an ongoing research work in Communication Design. As part of a multidisciplinary funded project on urban regeneration, this work aims at developing an interactive, digital tool directed to multiple stakeholders (from real estate developers to public authorities) for visualizing, exploring and analyzing multivariate urban perception data (e.g. visual, emotional, cognitive & physiological) to inform urban regeneration initiatives.

THE MUSA PROJECT

Project aim: the Multilayered Urban Sustainability Action (MUSA) project aims at fostering the collaboration between citizens, public authorities and private sector in shaping sustainable urban regenerations policies and interventions.

To achieve this goal, it will develop a set of digital solutions to enable the collection, analysis and dissemination of objective environmental data (gathered from sensors and databases) and subjective personal measures (both psychological - obtained through on-site surveys - and physiological - collected from sensors and wearable technologies) to provide a comprehensive understanding of the human-environment relationship and support decision-making processes at different scales of intervention.

Main data gathered:

ENVIRONMENTAL
- Temperature
- Humidity

PSYCHOLOGICAL
- Emotion (likert-scale)
- Senso of restoration (likert-scale)
- Ease of understanding (likert-scale)
- Nudging exploration (likert-scale)
- Identification of landmarks
- Identification of activities associated with the site (e.g. “social”, “mobility”, “work”, ...)

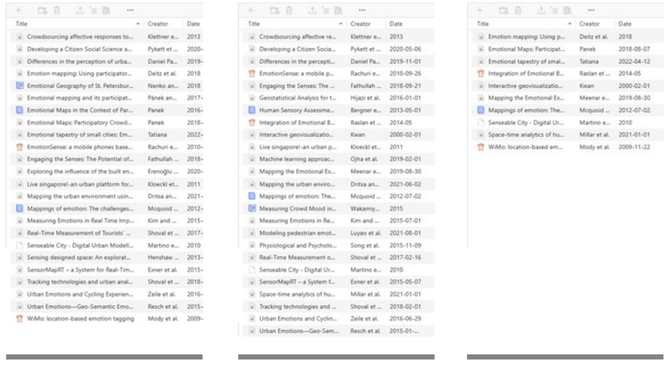
PHYSIOLOGICAL
- Heart Rate Variability (HRV)
- Electrodermal Activity (EDA)
- Eye Tracking

OTHER
- Demographics (age, gender, nationality, education)
- Position (via GPS)
- Picture of the site (taken by participants)

RESEARCH PROCESS AND OUTCOMES

DESK RESEARCH

Literature review on Urban Perception



Focus on Data Gathering: 24 items

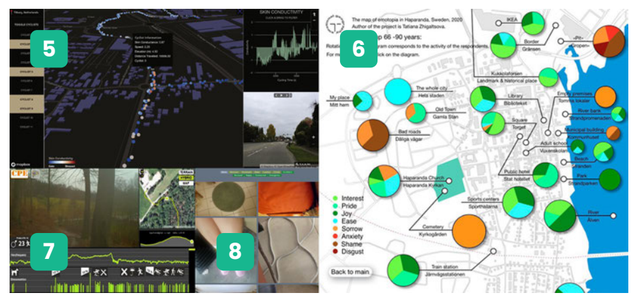
Focus on Data Analysis: 25 items

Focus on Data Presentation: 10 items

Current research mostly focuses on data gathering and analysis, overlooking data presentation.

Case study analysis: visualizing urban perception data

Existing works use few data types and limited typologies of visualization.



Few studies result into interactive tools that allow for data analysis & exploration.

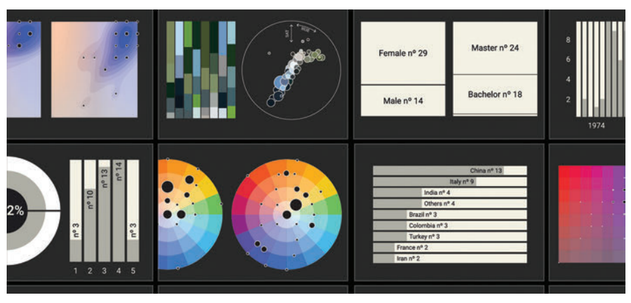
RQ 1: ***How do we represent a rich set of multivariate data through user-friendly visualizations?***

RQ 2: ***How do we design a digital tool allowing data exploration & analysis to diverse stakeholders?***

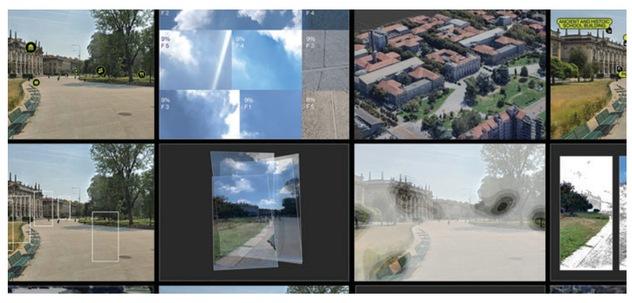
RESEARCH THROUGH DESIGN

Addressing RQ 1: Identification of models for the multimodal representation of the urban environment characteristics and its perception by citizens - objective environmental data and subjective personal measures (both psychological and physiological). Models have been selected considering the different data collection scales.

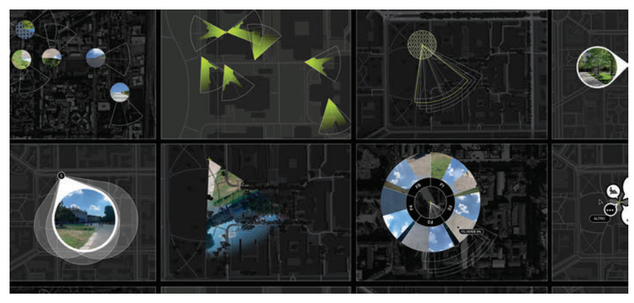
Abstract



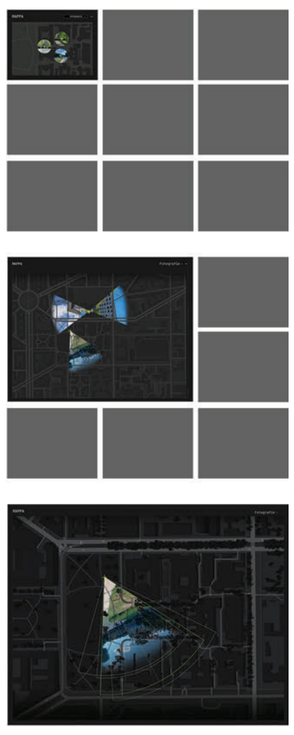
Figurative



Map-based



Addressing RQ 2: design of an interactive, digital tool for allowing multiple users (with different information needs and literacy skills on urban planning) to visualize, explore and discuss urban peception data.



Adaptive modules.

To adapt to different use contexts & information needs:
- Visualizations can scale to include additional data.
- Visualization boxes can be set to different modes depending on the user or the purpose (from "view only" to "interactive exploration" mode).

Flexible layout.
- Users can scale and move modules.
- Users can add comments and notes.
- Users can add sections, building a report-like dashboard that can be saved as a pdf and shared.

What’s next? Data from a pilot study is informing an early dashboard prototype, currently being developed. Effectiveness and usability of the resulting visualizations will be tested using both quantitative (error rate and time on task) and qualitative (interviews, and observations with think-aloud protocol) methods.

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Regenerative City and Territorial Development

Co-designing benefits for People and Nature

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Cultural spatial synergies. Interactive and digital community maps as an enabling tool for restorative design

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ABSTRACT |

This paper explores the contribution of design in identifying an accessible, open, and expandable tool capable of communicating and promoting local territories through the enhancement of tangible and intangible heritage, while actively involving communities in the support of design processes. Participatory and co-design approaches are highlighted as effective practices to engage local actors in the development of place-based strategies for heritage enhancement. Within this perspective, design assumes a restorative role (Antonelli, 2019), reinforcing the relationship between people and place, fostering awareness of their interdependence, and enabling synergies between local knowledge and established design methodologies for collaboration and social cooperation toward territorial enhancement (Bujdosó, 2019; Villari, 2012). The investigation into communicative tools and scalable processes for the enhancement of heritage across different types of territories is grounded in a pilot study conducted in a rural inner area of Italy. This area, characterised by natural landscapes, productive agricultural activity, and low population density, serves both as a field of inquiry and a complex design context. Initial desk research and fieldwork led to only partial identification of natural, architectural, and community-based heritage. It was through the identification of "entry keys"—places and people that offer access to primary or secondary sources, understood as "narrative carriers" (Studio Azzurro et al., 2011)—that a deeper understanding of implicit and explicit heritage narratives and traces emerged (Fagnoni, 2018, p. 17). Among the tools promoted by design for territorial contexts, the community map (Filippi et al., 2022; Menzardi, 2021) stands out as a device for translating collective knowledge and local specificities into visual and descriptive representations. These maps act as dynamic archives that document local identity and memory while prompting reflection on past, present, and

future transformations.
The research team identified the interactive digital community map as an enabling infrastructure for surfacing and preserving a plurality of traces—those perceptible signs of what remains over time [...] the core of cultural heritage, layered and identity-bearing for a community and its territory (Fagnoni, 2018). As an open tool, the digital community map supports multimodal communication systems and fosters shared storytelling practices that overcome the limitations of static paper-based mapping. It is specifically designed to engage non-expert audiences through the collaborative sharing of multimedia content.

KEYWORDS | COMMUNITY MAP, PARTICIPATORY DESIGN, CO-DESIGN, RESTORATIVE DESIGN, LOCAL HERITAGE

1. Introduction

The paper explores the contribution of design to territorial enhancement processes, investigating design practices capable of fostering the rediscovery and reactivation of local tangible and intangible heritage, as well as the participatory engagement of communities within a multidisciplinary requalification research project focused on the enhancement of inland areas and involving, in addition to design, urban planning and architectural design.
Participatory and co-design processes can promote the direct involvement of local actors—institutions, associations, cooperatives, residents—and guide the development of enhancement strategies grounded in the specific characteristics of place. Within this perspective, design takes on a "restorative" role (Antonelli, 2019, p. 16), capable of strengthening the relationship between people and places, fostering awareness of their interdependence, and contributing to the regeneration of compromised environmental, social, or cultural balances.
By supporting the creation of meaningful connections between people and place, design promotes the collective well-being and resilience of communities. In this sense, the designer operates as a facilitator and mediator (Cristallo, 2017, p. 16; Manzini, 2015; Sanders & Stappers, 2012; Siani, 2011) of synergistic relationships between lived experience, place knowledge, local narratives, and the integration of situated design methodologies (Franzato, 2009; Morozzo et al., 2023; Parente & Sedini, 2018; Villari, 2012). These interventions generate relational artefacts, systemic services, and collaborative environments (Meroni & Sangiorgi, 2011) capable of initiating and sustaining enhancement processes grounded in the rediscovery and reactivation of local heritage through community participation. These include analogue or digital devices that enable access to structured narratives; infographics, online platforms, site-specific installations and exhibitions that foster direct engagement with the subject; and events or performances that build collective momentum around specific themes, generating social and cultural value and helping shape the identity and potential of places.

2. The research project "STAI Veneto – Slow Tourism for Agrifood Integration"

The research project STAI Veneto – Slow Tourism for Agrifood Integration, conducted between January 2024 and February 2025, investigates strategies for enhancing a rural area in eastern Veneto (Italy) through the design of a ring-shaped cycling itinerary. The

route, located east of the Munich–Venice cycle path (link), interconnects the municipalities of Conegliano, Cordignano, Codogné, and Gaiarine. It aims to promote slow tourism while highlighting the cultural and productive value of local agri-food systems. The area is classified as an inland region and is characterised by natural landscapes, an active agricultural fabric, and low population density.
The research follows an interdisciplinary design approach, articulated through specific disciplinary focuses.
From the perspective of architectural and urban design, spatial scenarios are developed to enhance existing built heritage and regenerate marginal areas, with attention to ecological integration and social activation. From an urban planning standpoint, the project proposes strategies that link cycle infrastructure to territorial enhancement and local development, in synergy with the agri-food landscape.
The design dimension is structured around two core focuses. The first involves the development of a territorial visual identity system, intended to define a scalable and multimodal model that supports both local communities and extraterritorial networks, aligning with existing cultural assets, routes, and products. The second focus—carried out by the authors of this contribution—explores the enhancement of local heritage through the implementation of a collaborative narrative infrastructure, mediated by a digital platform. This tool is conceived to give voice to the plurality of territorial memories, enabling a shared narrative ecosystem through an open, multimodal communication system that encourages community participation and supports continuous content co-creation and updating.
Narratives—translated into situated experiences—trigger mnestic and identity-building processes, both individual and collective, that promote learning and the social valorisation of local heritage as a strategic resource (Bosco et al., 2024).
Following an exploratory phase aimed at identifying tangible and intangible assets through site investigations and community engagement, the design research group identified the community map as a strategic narrative device to convey and reflect the outcomes of the first phase back to both the interdisciplinary team and the local stakeholders.
The analysis of existing community mapping projects—selected based on their affinity with the strategic goals and contextual features of the area—informs the conceptualisation of a digital community map. This tool is intended as an online, scalable platform, characterised by a responsive interface adaptable to different modes and contexts of use (desktop and mobile), and designed to foster accessibility, collective authorship, and the long-term enhancement of territorial knowledge.

3. Community map as a resource for design for territory

Among the tools that have been considered by design for the territory, the community map is a device that enables participatory mapping experiences implemented by local communities with the aim of consolidating their own values, preserving their traditions and fostering development (Cristallo, 2023, pp. 40-41; Filippi et al., 2022; Menzardi, 2021). Since community maps enable the collection and representation of information, knowledge, impressions and details of place, they are particularly valuable for enhancing, recovering, enhancing, preserving, and transmitting local memories, know-how, and lived experiences—fundamental components that shape the identity of a territory and its inhabitants.
Participatory design and co-design practices are frequently employed in the creation and use of community maps (Cerutti et al., 2022), following both systemic (Bistagnino, 2011; Tamborrini, 2012) and strategic (Lupo, 2021) design approaches to address

contemporary challenges related to territorial development and enhancement.
The community map—an adaptable and scalable tool suitable for a wide range of contexts, from densely populated urban areas to remote rural regions, including territories affected by environmental or social emergencies—aims to highlight both the physical features of a place (such as buildings, roads, or natural areas) and its intangible assets, including histories, traditions, local know-how, and social dynamics. These maps diverge from the objective representation provided by analytical geographic maps, which rely on technical language and are often detached from the lived experiences of local communities. Instead, they embrace a participatory approach that activates a system for gathering and preserving cultural heritage that might otherwise be fragmented or lost (Filippi et al., 2022, p. 473).
The representation of territorial heritage developed in collaboration with local stakeholders strengthens the community's sense of belonging and anchors existing traces of the territory onto the map, transforming them into authentic narrative media that are shared and accessible to both local and extraterritorial online communities. As Raffaella Fagnoni (2018) observes,

> "traces are perceptible signs of what remains over time: objects, works of art and craftsmanship, traditions, foods, places, and memories. [...] They represent the heart of a community's stratified and identity-based cultural heritage. They are not simply history, but the living matter of a historical process that prompts questions about their meaning, breathing new life into them. Traces generate reflection and open up possibilities, becoming essential elements of a territory understood as a reservoir of experiences and meanings" (p. 17).

Caterina Madau (2015) approaches the topic of community maps from an economic-political perspective, highlighting their potential as dynamic archives of local knowledge. These maps capture the identity of a place while fostering connections between inhabitants and their territory, thereby reinforcing a sense of belonging. Thanks to their participatory nature, community maps emerge as strategic tools through which diverse fields—such as architecture, anthropology, spatial design, and territorial planning—can uncover hidden resources, activate new relationships among local actors, and support processes of cohesion and resilience. Paola Menzardi (2021) describes community maps as bridges between past, present, and future: while they document collective memory and local heritage, they also encourage critical reflection on ongoing transformations and untapped potential.

4. Towards the STAI Veneto community map

The initial phase of the research, focused on the analysis of the geographical area under study, was aimed at mapping local heritages. This activity led to the exploration and classification of existing resources, as well as the identification of the relevant spheres of reference through which they could be explored.
The categories identified include: the architectural and natural heritage, elements that define and characterise the landscape; the historical and artistic heritage, which can be investigated through documentary and iconographic sources; the social and community heritage, which restores the identity traits of the community through direct evidence and ritual practices of aggregation; and finally, the specific food, wine and craftsmanship features of the area, which can be traced through direct comparison with the local production fabric.
The second phase of the research focused on identifying potential "entry keys" (Castelli et

al., 2005, p. 3)—places and individuals capable of facilitating access to primary and secondary sources that carry explicit or implicit narratives related to local heritage (Studio Azzurro et al., 2011)—as well as on recognising the corresponding tangible and intangible traces (Fagnoni, 2018, p. 17). The entry keys that emerged from the territorial analysis include farms, museums, libraries, local festivals and commemorative events, along with institutions engaged in the promotion of the area's cultural, economic, and environmental resources. The identification of 40 local actors subsequently guided and structured the planning of on-site visits.

4.1 On-site visits to identify sources and resources

The on-site visits (**Table 1**) were conducted to validate the reliability of preliminary findings and to establish direct contact with places and individuals previously identified as potential entry points for tracing specific and original narratives related to local heritage. During the initial three visits, exploratory tours were undertaken to museums preserving elements of local culture, as well as to significant landmarks and community gathering spaces. However, these field trips did not lead to the identification of individuals capable of providing substantial testimonies and information necessary for the development of a comprehensive body of content associated with the heritage sites. Consequently, three additional field trips were organized with the objective of further investigating the identified content and documenting it through video and photographic reportage.

The findings emerging from the in-depth site visits revealed a fragmented and somewhat inconsistent knowledge base. This prompted the need to initiate a dedicated event aimed at eliciting local narratives by engaging key stakeholders actively involved in the area—such as representatives from cooperatives, associations, libraries, museums, and cultural event organizers. The objective was to enrich the understanding of local heritage through the collection of memories, knowledge, and testimonies capable of giving voice to the cultural landscape. As a response, a co-design workshop was convened (Bujdosó, 2019, pp. 42–63; Muratovsky, 2022; Rizzo & Sangiorgi, 2009). The invitation to take part in the workshop was circulated among the representatives of the "entry keys," who subsequently disseminated the initiative within their respective communities of interest.

Table 1. On-site visits plan and objectives.

	Entry keys [places and people that can lead to primary or secondary sources, to "bearers of implicit and explicit narratives"]		**Research areas where identifying traces** [signs of time, potential mediums of narratives]				
	Museums / Libraries	**Institutions**	**Festivals / Local celebration**	**Historical-artistic culture**	**Geography**	**Community**	**Local productive system**
Objectives	Accessing sources related to local heritage.	Deepen the knowledge of local heritages through the perspective of actors actively engaged in the cultural, economic or natural territory.	Participate in community gathering events related to the promotion of local products and traditions. Meet the community and identify contexts in which to promote participatory activities.	Historical Heritage [Historical events, commemoration, historical buildings, archaeological sites] Artistic Heritage [Paintings, films/ videos, sculptures, photographs]	Architectural Heritage [Squares, streets, urban spaces, monuments, civic buildings, religious architecture] Natural Heritage [Landscapes, waterways, parks, geomorphological formations]	Community Heritage [Popular traditions and festivals, social gathering places] Social Heritage [Community associations and networks, people, shared traditions and knowledge]	Enogastronomic Heritage [Local products, traditional crops, markets, food festivals] Craftsmanship Heritage [Traditional craftsmanship, local materials, artisan workshops]

4.2 Co-design for the Enabling of Cultural Spatial Synergies

The workshop was structured in two phases. The first phase, conducted remotely, initiated a process of individual reflection through the completion of a questionnaire by each participant. The second phase, held in person, facilitated group dialogue and exchange, with the aim of enabling the recognition of elements to be acknowledged as shared cultural heritage. The questionnaire consisted of ten open-ended questions. Participants were invited to identify, across various forms of heritage—architectural, natural, historical, artistic, community-based, agri-food, culinary and oenological, and artisanal—the following: distinctive elements shaping the identity of the place; potential carriers of narratives associated with these elements; personal testimonies related to these heritage dimensions.

The first phase involved the participation of four representatives from cultural associations, one representative from a civic library, and three representatives from local museums.

The second phase of the workshop, held in person at the Museo degli Alpini in Conegliano (TV), comprised four group-based activities (Table 2). Given the limited number of participants who had completed the initial questionnaire, this phase was opened to all those who had responded. The first activity involved a personal introduction through a narrative object—an item capable of symbolizing both an emotional and symbolic connection between the participant, their role or affiliation, and the local territory. This exercise helped initiate and guide the ensuing dialogue by framing the participants' identities and clarifying their role within their respective communities.

The second phase of the activity began with the collective presentation and discussion of insights emerging from the questionnaire. This material served as a shared reflective foundation to orient the participatory dialogue. The session was primarily dedicated to the selection of local heritage assets to be featured in the co-designed communication tool for the territory.

This phase also involved a collaborative validation of the associated narratives and a critical reflection on the most suitable media formats for communicating these heritage

elements to audiences beyond the local context. To support this process, participants were invited to visually map and situate the selected heritage assets on a blank geographic map of the area, thus enabling a spatialized representation of collective cultural memory.

Table 2. Workshop: phases, activities and objectives.

	Questionnaire Data collection and synthesis [remotely]	**Co-design sessions** [in person]			
Participatory design : phases and activities	Data collection aimed at contributing to the preparation of the in presence activity and to the bottom-up definition of the territorial knowledge.	Activity 1 Presentation of the participants and their personal connection with the territory through a 'narrative object'.	Activity 2 Graphic representation of heritage elements on a blank map of the area of interest.	Activity 3 Identification of f unvalued heritage and other points of interest.	Activity 4 Anticipating the potential impact
Objectives	Mapping of local heritages identified through an internal and bottom-up perspective.		Selection of local heritage assets to be featured in the co-designed communication tool for the territory.		Interpretation of what value the project can generate for the area. Identification of what actions are needed to activate this value. Collective reflection on how the project can have a concrete impact on the community.
Design	**Design of the process** Design of a participatory design tool for the awareness and enhancement of territorial heritage.		**Design of the system** Definition of strategies to ensure that the participatory design tool maintains its effectiveness over time after its creation, facilitating the emergence of self-sustaining processes and can ensuring the long-term continuity and effectiveness.		

The third activity sought to explore participants' awareness of currently overlooked or underutilized heritage assets deemed worthy of recognition. Using thematic post-its, participants identified a range of points of interest—including agricultural landscapes, rural and former industrial buildings, and sites of religious architecture.
Beyond the spatial mapping of these neglected heritage elements, the ensuing collective discussion also revealed participants' openness and willingness to engage in future initiatives aimed at valorising the local territory through collaborative design processes.
The fourth activity focused on anticipating the potential impact of implementing and promoting the community map. The design intention was to articulate strategies that would support the long-term continuity and effectiveness of this collaborative mapping tool. The aim was, in particular, to stimulate the emergence of self-sustaining processes—capable of fostering durable, positive transformations within the territory and across its communities. Participants were invited to reflect on the anticipated benefits of the project in both the short term (within one year) and the medium term (within five years), with reference to key target groups: residents, institutions, tourists, and the territory itself.
In the short term, the expected benefits included increased awareness of local specificities, the strengthening of networks among residents and associations across the involved municipalities, and the promotion of responsible tourism—though some concerns were raised about the potential risk of fostering superficial 'touch-and-go' tourism dynamics. Looking ahead to the medium term, participants envisioned a more sustainable use of local resources, alongside the development of a community archive of

traditions aimed at safeguarding and transmitting intangible cultural heritage over time.

Figure 1. Participants engaged in the mapping of local heritage during the co-design workshop at the Museo degli Alpini, Conegliano (Italy), October 2024. Photograph by Claretta Mazzonetto.

5. Open Systems for the Knowledge and Enhancement of Local Heritage

Upon concluding the main phase of research—focused on identifying heritage assets, "entry keys," and situated narratives capable of supporting the enhancement of the study area—the research team recognised the development of a community map as a meaningful outcome. This map was conceived as a way to integrate and give value to the plurality of traces collected through diverse narrative media, to support their long-term preservation, and to enable future expansion of the archive as a shared data source for territorial-scale planning. Rooted at the intersection of design, digital humanities, and information visualization for cultural heritage (Formia & Zannoni, 2018; Trocchianesi & Bollini, 2023), the community map is understood as an open tool: one that supports multimodal communication systems and fosters shared storytelling practices. The accessibility (Orletti, 2021), openness, and interactivity enabled by digital artefacts led to the identification of an interactive digital community map as the key outcome of the heritage and narrative mapping process. Thanks to its inherent flexibility, this format overcomes the updateability constraints of static community maps and is specifically designed to engage non-expert audiences by both offering and receiving multimodal content—such as videos, photographs, voice recordings, and digitised documents. In pursuit of an open, widely accessible, and user-friendly system, the research was oriented towards the integration of existing digital and interactive Geographic Information Systems (GIS) with embedded geolocation capabilities.

Table 3. Analytical framework to systematise and process the data collected through the workshop.

Areas of Inquiry and	**Historical and artistic culture**	**Geography**	**Collectivity**	**Productive system**
Place				
Heritage	Historical Artistic	Natural Architectural	Community based Social	Enogastronomical Craft
Traces	Material and immaterial signs of lived time and space, recognized as indicators of memory, identity, and transformation: architectures, artefacts, natural elements, toponyms, practices.			
Media for Trace Narration	Texts; Reproductions; Drawings; Photographs; Images; Video interviews; Video animations; Audio narratives; Geolocated podcasts; Storymaps; Site-specific installations; Interactive infographics.			
Narratives	Situated narratives; Recomposition of dispersed memories; Editing of multivocal content.			
Actions for Enhancement	Participatory workshops and gatherings to collect oral histories and local testimonies; Production of multimedia content; Public events; Educational activities; Development of thematic tourism itineraries; Narrative mapping labs; Co-documentation workshops; Construction of participatory multimedia archives; Public restitution events; Co-design of geolocated narrative itineraries; Interactive environments for enhanced place-based engagement.			
Local actors	Carriers of situated knowledge; Territorial facilitators; Cultural actors; Local mediation agencies such as residents, cooperatives, associations, libraries, museums, event promoters.			
Beneficiaries	Local inhabitants; Tourists and visitors; Scientific community; Online audience.			
Expected Impact	Activation of mnestic and identity processes; Emergence and sharing of situated narratives; Growth of awareness within resident communities; Dissemination of knowledge; Promotion of the territory and local heritage; Enhancement of territorial identity traits; Strengthening of community agency.			
Enhancement	Historical; Tangible; Social; Situated cultural; Landscape-based; Environmental; Artistic.			

Table 4. Heritage case sheets from the municipality of Gaiarine: two examples.

Place	Heritage Type	Traces	Narratives	Media for Trace Narration	Actions for Enhancement	Local Actors	Beneficiaris	Anticipated impact	Enhancement Dimensions
Case 1 – Rivers: Livenza, Resteya, Aralt									
Gaiarine, Treviso (Italy)	Natural heritage (riverscape and water-based livelihoods).	Boats, docks, rerouted waterways; architecture shaped by water dynamics; oral traditions linked to rivers.	Barcarolo tradition; River-based urban change; Family stories and river rituals.	Archival photos; Oral recordings; Historic maps; Video interviews; Augmented reality installations.	Digitizing oral histories; Geolocated route; Public storytelling; School workshops.	Associazione 'La Corrente'; Luigino Celotto; Middle School; Elders; Municipality ..	Students; Tourists; Families; Researchers	Collective memory revival; Awareness growth; Place-based identity; Valorisation of lesser-known assets	Environmental; Historical; Cultural; Social.
Case 2 – Maglio Tonet									
Gaiarine, Treviso (Italy)	Historical and community-based heritage (rural industrial memory and craft knowledge).	Structure and machinery of the forge; tools and benches; workshop spatial setup; traditional technical gestures.	Archival videos; Digitised tematic comic; Audio interviews; Photographs; Illustrated infographics.	Evolution of rural forge; Workers' daily life; Technical knowledge space.	Multimedia archive; Public exhibition; Cycling route stop.	Luigino Celotto; Angelo Busetto; Middle School; Ex Workers' families.	Students; Visitors; Local families.	Heritage reactivation; Broader access; Tourism and education link	Tangible; Social; Cultural; Educationa; Historical

5.1 Framing and Selection Criteria for Case Studies

To inform the design of a digital, collaborative community map for the inner area of Eastern Veneto, a review of relevant case studies was conducted. These were selected based on shared objectives and the typology of territorial contexts involved. The projects examined relate to marginal areas characteristic of the Italian landscape—contexts in which the researchers had direct experience—where tangible and intangible heritage is at risk of being neglected and relegated to a peripheral or inactive status.

A unifying feature across these cases is the emphasis on participation, regarded both as a goal in itself and as a means through which the potential of territorial representation tools can be revealed and activated.

The selected case studies serve as examples of how to calibrate user interaction within the geographic context—positioned between the production of information for primarily commercial purposes and the creation of cultural content related to places, lived experiences, and local memory. These interventions are aimed at enhancing the communicability of the collected informational heritage, establishing a foundation upon which to build strategies for heritage enhancement at the territorial scale.

At the same time, they illustrate approaches to organising and shaping information in ways that facilitate the rediscovery of shared knowledge, values, and resources—essential for conveying and narrating the territory to a diverse audience.

The selected research projects meet the following criteria: they were initiated in Italy

between 2014 and 2020; they aim to facilitate access to knowledge related to both tangible and intangible heritage; they focus on marginal or marginalised areas; and they involve the development of web-based platforms featuring digital interfaces for the spatial representation of places—such as maps, illustrations, and infographics—that enable access to multimedia content connected to the territory.
The case studies were analysed and compared according to a set of core assets: the geographic areas and types of heritage addressed; the funding bodies and project teams involved; the objectives pursued; the range of actors engaged, including promoters, beneficiaries, and stakeholders; and the outcomes achieved. These outcomes include mapping processes, tools developed to support access and engagement with heritage content, and the participatory strategies adopted. Further dimensions of analysis included the anticipated impact and the feedback gathered over time.
Given that the broader aim of community maps—extendable to other participatory territorial design practices—lies in promoting a mode of use that goes beyond isolated and one-off interventions, this tool is positioned within a systemic and integrated perspective. It is intended to coordinate activities, initiatives, and programs within a more structured and impactful framework, capable of generating a collective impact greater than the sum of individual actions (Menzardi, 2020, p. 5).
Accordingly, one of the key objectives of the analysis was to examine the relationship between the map and the communicative system through which it is disseminated, with the aim of assessing the capacity of the digital mapping and heritage-sharing tool to activate networks of relationships and knowledge exchange.
Within this framework, the study also investigated the role attributed to participation across the selected projects, with particular focus on the methods of engaging local communities and the extent to which bottom-up content production was encouraged as a foundational element of participatory processes.

5.2 Case Study Analysis

Among the case studies analysed, four were examined in depth as they illustrate how the introduction of digital technologies into the experience of place has enabled the experimentation with participatory territorial storytelling and the creation of exploratory itineraries for engaging with specific geographic areas. In these projects, users assume an active role in the narrative construction of place, both creating and interacting with content through processes of rediscovery and enhancement of local heritage.
The selected cases include the Tracciaminima initiative, a participatory project resulting in a hiking itinerary around Lake Maggiore; the Monte Rolla community map, where sampling and experiencing the local soundscape brought renewed attention to the area's historical trail network; the Comuniterràe project, a participatory cultural mapping initiative that reflects the shared identity of localities adjacent to the Val Grande National Park and supports the development of a community-based ecomuseum; and the Metagoon digital platform, which documents and promotes exploratory routes through the intangible heritage of the Venetian lagoon ecosystem.
In all these examples, the map is conceived not as a final output, but as an intermediate result within an ongoing process. It functions as an enabling infrastructure—activating latent resources embedded in place and sustaining longer-term processes nourished by the energy generated through participatory engagement.

5.3 Tracciaminima: A Participatory Walking Project Around Lake Maggiore

Tracciaminima: A Participatory Walking Project Around Lake Maggiore
Launched in 2020 by a multidisciplinary team of young professionals, Tracciaminima is a

participatory mapping initiative aimed at enhancing the transregional landscape surrounding Lake Maggiore through a 230-km walking route. The project fosters slow, responsible tourism and encourages a reflective engagement with the territory through the practice of walking.
The digital map is co-created with local communities, who contribute to identifying and geolocating both tangible heritage (trails, historical sites, landscapes) and intangible elements (knowledge, stories, collective memory). Residents actively participate in territorial narration by submitting photographs, testimonials, and annotations.
The platform functions as an enabling infrastructure, open and expandable, aggregating user-generated content and supporting a multimodal and shared experience of the territory. Supported by the European Solidarity Corps, the initiative formalised in 2023 as a social promotion association, broadening its local presence.
Tracciaminima has fostered collaborative networks among institutions, citizens, and associations, activating place-based engagement and promoting the regeneration of marginalised areas. The official inauguration of the route in April 2025 marked a symbolic moment of public restitution and consolidation of the community ties formed through the project.

Table 5. Case study analysis Tracciaminima.

Tracciaminima	**Motivations/objectives**	**Actors involved**	**Output/Tool**	**Impact**
Year 2020-ongoing	To frame walking as a tool for place-based observation and informal learning, with the goal of enabling local communities to take an active and autonomous role in the co-design and management of cultural and territorial heritage.	**Promoters** **Social promotion association** **Beneficiaries** Hikers Local residents **Stakeholders** Local residents	A circular hiking route mapped as an interactive digital interface, co-produced with the community and enriched with geolocated multimedia content..	**Anticipated Impact** Promotion of slow and sustainable tourism, capable of triggering a change in both travellers/ tourists and local resiudents, favouring the creation of renewed connections between the parties.
Geographical area Lago Maggiore Provincia di Varese Italia				**Feedback** The project facilitated the formalisation and consolidation of social ties activated throughout the process. The route was officially inaugurated in April 2025.
Heritage to be enhanced by the project Natural / Community-based / Architectural				
Funders European Union funds				
Team Graphic designer Community manager Travel consultant Nature guide Editor **Website** https://www.tracciaminima.it/cammino-lago-maggiore/				

5.4 Community Map of Monte Rolla

Monte Rolla Community Map: From Independent Research to Community Empowerment
The Monte Rolla Community Map project focuses on a mountainous area in the Province of Sondrio, characterised by significant natural, landscape, and cultural values embedded in local stories, agricultural practices, and mountain-based knowledge. Initiated between 2016 and 2017 by an interdisciplinary group of researchers, participatory geography experts, environmental educators, and community representatives, the project employed soundscapes as a medium for interpreting inhabited spaces and identifying heritage elements worthy of recognition and enhancement.
Funded by local administrations and private foundations (such as Fondazione ProValtellina and Consorzio BIM Adda), the initiative resulted in a digital illustrated map, designed as an interactive online tool through which users could access audio recordings and sound-based narratives. These sound traces conveyed tangible and intangible aspects of local heritage and supported new connections among residents, researchers, and visitors.
Participation was framed as a process of community empowerment, strengthening people's relationship with their environment and enabling the aggregation of heritage elements into a shared, transgenerational understanding of place. In 2019, the community map—now no longer accessible online—served as a strategic reference in the revision of the local zoning plan (Menzardi, 2021, p. 207). It also contributed to the restoration of a historic trail network connecting hamlets to the valley floor, leading to new sport and tourism initiatives aimed at fostering broader public engagement with local knowledge.

Table 6. Case study analysis Community Map of Monte Rolla.

Community map of Monte Rolla	**Motivations/objectives**	**Actors involved**	**Output/Tool**	**Impact**
Year 2016–2017	To explore soundscapes as a method for interpreting inhabited spaces and identifying place-based assets for heritage enhancement and territorial understanding.	**Promoters** Local ecomuseum Social promotion association Independent research centre **Beneficiaries** Local residents Visitors **Stakeholders** Local residents Schools cultural Associations Municipal administrations	An illustrated interactive map published online, allowing access to geo-referenced audio recordings and curated soundscapes connected to the territory.	**Anticipated Impact** Integration of multiple heritage layers into a shared narrative that connects the area's cultural memory across time.
Geographical area Province of Sondrio Italy				**Feedback** Restoration of the historical trail network connecting villages and the valley floor, alongside new sport and tourism programs promoting its use across multiple audiences and scales.
Heritage to be enhanced by the project Natural / Historical / Community-based / Architectural / Craft / Enograstronomical				
Funders Municipal administrations Local municipalities consortium Private foundation				
Team Researchers Illustrators Sound artists **Website** No longer accessible				

Figure 2: Community Map of Monte Rolla.

5.5 Comuniterràe: Participatory Mapping for a Shared Territorial Identity

Comuniterràe is a community-based cultural project initiated in 2017 by Ars.Uni.VCO – E.T.S. and the Val Grande National Park, supported by the Piedmont Region and the VCO Community Foundation. As part of the European Charter for Sustainable Tourism, the project aims to establish an ecomuseum as a platform for territorial enhancement (Bollati et al., 2023). Engaging around 250 residents across 10 municipalities, the project activated participatory processes to identify material and immaterial heritage elements —festivals, oral traditions, crafts, dialects, and everyday cultural practices (Perlo, 2018). Its core outcome is a set of digital community maps, one per municipality and one collective, accessible via an online platform and organised around selected place-based identity markers (Bollati et al., 2023). Working through thematic groups led by a professional facilitator, the initiative generated an open digital archive composed of historical photographs, local stories, personal documents, and oral histories contributed by residents. These contents are indexed by theme and location, and made accessible both online and via QR codes placed throughout the territory, often linked to community walks guided by local inhabitants (Cerutti et al., 2021).

Public restitution events further reinforced local engagement. Since 2018, Comuniterràe has produced significant impacts: civic activation, uncovering of underrepresented heritage, development of new educational and cultural tourism practices (Bagnati & Perlo, 2018), and the strengthening of networks between municipalities, schools, cultural associations, and citizens.

Table 7. Case study analysis Comuniterràe.

Comuniterràe	Motivations/objectives	Actors involved	Output/Tool	Impact
Year 2017–ongoing	To establish an ecomuseum for sustainable territorial development and heritage safeguarding; to connect municipalities through a shared cultural identity	**Promoters** University research centre (initial) Comuniterràe APS association (since 2023) **Beneficiaries** Local communities (10 municipalities) Online communities **Stakeholders** Local residents Schools Cultural associations Municipal administrations	Digital archive of local heritage; digital community maps; guided walks led by residents; cultural events.	**Anticipated Impact** Sustainable development; territorial cohesion; establishment of a community-led ecomuseum.
Geographical area 10 municipalities Province of Verbano-Cusio-Ossola Italy				**Feedback** Project generated further initiatives and fostered a shared sense of belonging. Awarded the European Heritage Award / Europa Nostra Award (2019).
Heritage to be enhanced by the project Natural / Historical / Community-based / Architectural / Craft / Enograstronomical				
Funders European Union funds				
Team PhDs in Territorial Design Experts in participatory geography Environmental educators Community representatives **Website** http://www.comuniterrae.it/				

Figure 3: Community Map Comuniterràe.

5.6 Metagoon: Participatory Mapping for the Cultural and Environmental Safeguarding of the Venetian Lagoon

Launched in 2015, Metagoon is a collaborative mapping project aimed at exploring, documenting, and enhancing the Venetian lagoon—a fragile ecological system and a culturally layered landscape. The project seeks to represent the complexity of lagoon heritage by intertwining material practices—such as fishing, navigation, and land transformation—with intangible dimensions including oral histories, local knowledge, and intergenerational relations.

At its core lies a multimedia digital platform, conceived both as a dynamic archive and a narrative interface. The interactive map enables the geolocation of audiovisual content, interviews, infographics, and downloadable texts. Users can explore thematic paths—ranging from environmental sustainability and industrial development to traditional fishing techniques—positioning the archive as a tool for research, knowledge dissemination, and ecological education (Marcon, 2021).

The project is grounded in a participatory design framework, in which local communities act as co-producers of content. Through interviews, workshops, night walks, and guided explorations, participants contribute to the co-construction of a shared memory infrastructure, strengthening their territorial agency and sense of stewardship.

Metagoon is distinguished by its interdisciplinary methodology and its ability to mediate between local knowledge systems and global environmental discourse. Supported by the TBA21–Ocean Space Foundation and developed in collaboration with civic and scientific institutions (CNR-ISMAR, Here We Are Venice, Laguna B), the project activates a collaborative infrastructure for situated knowledge production and epistemic pluralism (Meschini, 2023).

Over time, Metagoon has become a space for ecological memory and collective territorial imagination, contributing to public awareness of lagoon transformations. Events such as "Water Communities across the Adriatic and Pacific" have reinforced this dimension, fostering dialogue between local and international practices and establishing a transferable model for coastal and insular territories.

Table 8. Case study analysis Metagoon.

Metagoon	**Motivations/objectives**	**Actors involved**	**Output/Tool**	**Impact**
Year 2015–ongoing	To preserve and disseminate knowledge related to the complexity of the Venetian lagoon ecosystem.	**Promoters** Designer / Videomaker **Beneficiaries** Local lagoon communities Researchers Online audiences **Stakeholders** Local residents Cultural institutions Partner networks	Digital platform with a community-based audiovisual archive; public events, exhibitions, night walks, collaborative mapmaking.	**Anticipated Impact** Creation of an interactive digital archive and activation of territorial narratives for ecological awareness.
Geographical area Venetian Lagoon Italy				**Feedback** Platform fully funded; generated further initiatives on lagoon regeneration and speculative geography.
Heritage to be enhanced by the project Natural / Craft / Enograstronomical				
Funders Private foundations Independent research centres				
Team Videomaker Interaction designer Graphic designer Web developer **Website** https://metagoon.net/				

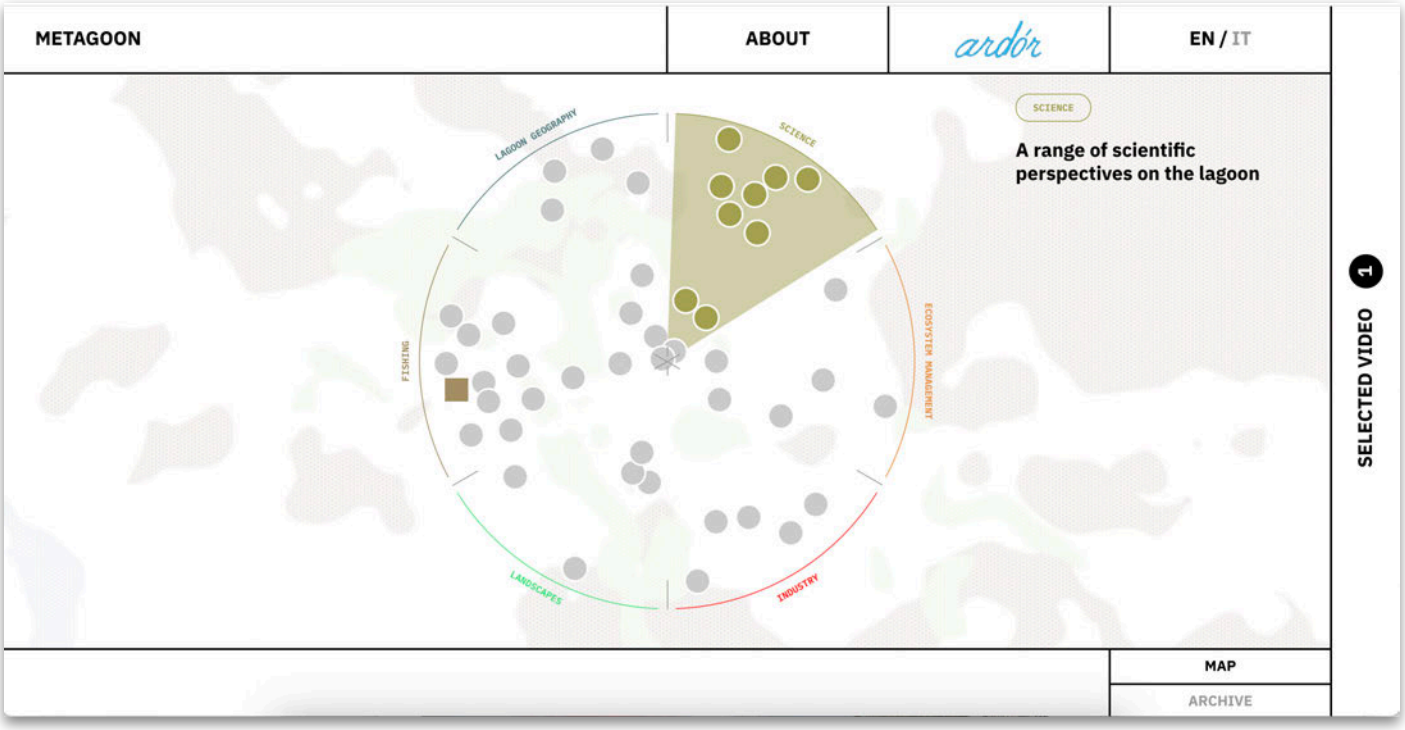

Figure 4: Desktop Interface of Metagoon.

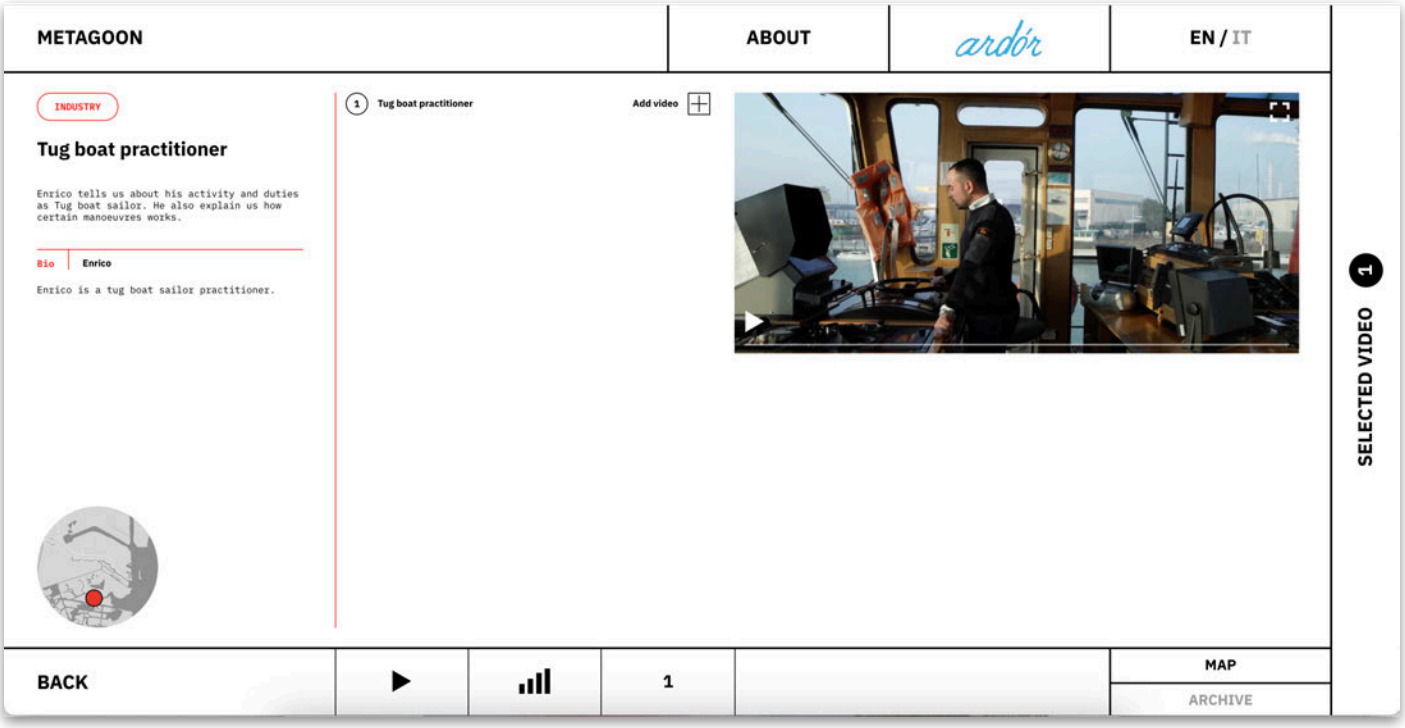

Figure 5: Desktop Interface of Metagoon.

6. Conclusions

This study highlights the contribution of design in supporting territorial development processes, with a specific focus on the integration of an open, digital, and accessible ecosystem for the valorisation of local specificities. The analysis demonstrates how design can activate place-based development models by fostering deep synergies between communities and their territories through the promotion of co-design practices. Within this framework, interactive digital community maps have emerged as enabling devices—inclusive, accessible tools that facilitate the articulation of local heritage and narratives, especially in marginal contexts marked by social, environmental, or cultural fragilities.

By activating new collaborative dynamics and surfacing latent territorial resources, community maps stimulate both individual and collective memory processes. They contribute to shared learning around the richness of local heritage and reinforce the relational bond between residents and place.

In the specific context of the "STAI Veneto" research project, participatory and co-design methodologies have been used to explore the potential of local communities as primary agents of territorial activation. Through the mapping of traces and the integration of digital tools in documentation, communication, and dissemination processes, the project has laid the groundwork for design infrastructures that mediate between local narratives and scientific dissemination.

The next stages of the research envision the systematisation of the collected data within an open, digital, and interactive community map, conceived to foster the diffusion of territorial knowledge and to generate long-term transformative impacts—including increased awareness of heritage value, the strengthening of social networks, the enhancement of place identity, and ultimately, the improvement of local quality of life.

The practices described here suggest a vision of design as an infrastructure for cultural and social innovation, capable of sustaining collaborative models that are both adaptable and replicable across diverse contexts.

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Design for placemaking: enhancing the intangible and soft aspects of the city. Reflections from an educational standpoint.

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ABSTRACT | The multi-dimensional concept of placemaking represents a significant effort to infuse urban spaces with vitality and a community-centric ethos. However, the specific contributions of design in placemaking processes require further exploration, especially in addition to urban planning studies. This paper reflects on the various contributions of design in placemaking, examining its transformative potential from an educational standpoint. It builds upon an inquiry conducted by the Cumulus Working Group, "Design for Placemaking," which seeks to investigate this field as distinct from architecture and urban planning.

Drawing from a literature review, the paper provides a preliminary definition of design for placemaking as a collaborative process that leverages cultural, relational, and policy elements to enhance communal value and sustainability. A central theme emerging from this definition is the recognition that design for placemaking primarily addresses the intangible and soft aspects of the city—such as the design of services, policies, collaborative processes, and accessible spaces that foster meaningful interactions and relationships. This approach adopts a community-centered, inclusive, and regenerative design perspective.

The paper then presents a selection of results from the inquiry, which collected case studies from design universities worldwide (UK, Canada, China, Spain, Australia, Mexico, among others). These case studies focus on the soft aspects of placemaking rather than its hard, infrastructural components. The intangible dimension of placemaking arising from these case studies is filtered through approaches such as the '15-minute city,' 'more-than-human,' 'service logic,' and 'community empowerment': they contribute to a more holistic understanding of placemaking, extending beyond physical spaces and the traditional human-centered approach.

Although still a work in progress, the inquiry has reflected on the reciprocity of care between urban spaces and citizens, the balance between community involvement and diverse stakeholder engagement, and the relationships between humans, non-humans, and the environment. These reflections are useful to suggest new educational paths for design students. Such paths would move beyond the design of physical spaces to envision how people can meet, work, and live while fostering a sense of community and shifting from mere 'space' to meaningful 'place'—where human and natural systems co-exist and co-evolve over time. While current design curricula may not fully support such programs, this inquiry offers a first step toward igniting a discussion on the need for comprehensive educational frameworks in design for placemaking.

KEYWORDS | PLACEMAKING, DESIGN EDUCATION, SOFT INFRASTRUCTURE, COMMUNITY

1. Introduction

Placemaking has emerged as a transformative concept within the broader discourse of urban development, characterized by its emphasis on shaping the public realm through inclusive, participatory, and community-centered approaches. While traditionally associated with urban planning and architecture, placemaking increasingly intersects with design, that is a discipline primarily concerned with the meaning and quality of the experience of the users, highlighting the role of intangible and relational dimensions—such as culture, collaboration, and shared meaning, indeed—in creating spaces that resonate with people's lived experiences. This paper explores these intersections through the design lens, positioning it as an enabler of placemaking because it looks at urban life's softer, and relational aspects before and beyond the physical interventions.

The inquiry presented here is grounded in the work of the Cumulus Working Group (CWG) on Design for Placemaking, an initiative that seeks to investigate design contributions in this field from an educational standpoint. The CWG aims to establish a shared framework that integrates diverse perspectives, methodologies, and practices, recognizing the potential of design education to foster innovative approaches to placemaking. This collaborative effort is driven by the hypothesis that it would be meaningful to discuss design for placemaking as a distinct area of inquiry and practice. An area that synthesizes insights from multiple design disciplinary fields while maintaining a focus on intangible elements such as community relationships, participatory processes, and cultural narratives.

To achieve this, the research adopts a dual approach: reviewing the existing literature and collecting case studies. The literature review provided an initial exploration of placemaking's conceptual foundations and its connections to design, setting the stage for a collaborative exchange of ideas during the CWG's inaugural meeting at the Cumulus 23 conference in Antwerp (Sedini et al., 2023). Following this, a global call for case studies was

launched to gather insights from educational institutions worldwide, focusing on how design for placemaking is practiced, taught, and conceptualized across different cultural and disciplinary contexts.

This paper is structured to guide the reader through the multifaceted nature of design for placemaking. After this introduction, Section 2 offers a contextual background, synthesizing key themes and definitions from the literature on placemaking and its intersections with design. Section 3 focuses on the case study collection and analysis, presenting the study's preliminary results and highlighting the contributions of design education to placemaking practices, and the recurring themes identified in the collected case studies. Section 4 attempts to draft possible educational implications, reflecting on how the findings inform the development of pedagogical frameworks that support design for placemaking. Finally, some reflections on future directions are proposed, envisioning a roadmap for expanding the discourse and practice of design for placemaking through collaborative and interdisciplinary efforts.

Through this exploration, the paper aims to contribute to the growing recognition of design as a vital force in placemaking, advocating for a holistic understanding of the city as a system of relationships, i.e., a truly regenerative city, while emphasizing the need for educational programs that equip designers to engage with its complexities.

2. Placemaking and Design: Contextual Background

The concept of placemaking has evolved as a multidimensional approach to shaping the public realm, emphasizing the importance of people, community, and sustainability. This section outlines a brief overview of the origins of placemaking and identifies possible intersections with the design disciplines. Lastly, a set of emergent themes is highlighted as they served as the basis for the collaborative inquiry conducted within the CWG on Design for Placemaking.

2.1 Placemaking: Definitions and Origins

Placemaking is broadly defined as a process and philosophy aimed at transforming "*spaces*" into meaningful "*places*" through community engagement and creative collaboration. The literature underscores its roots in the ideas of urban visionaries such as Jane Jacobs and William H. Whyte in the 1960s, who highlighted the need for cities to prioritize human-scale design over car-centric urban planning. Jacobs' emphasis on "eyes on the street" and Whyte's focus on social life in public spaces laid the groundwork for placemaking as a participatory and community-driven process (LeGates & Stout, 2020). The term itself was popularized by the Project for Public Spaces in the 1980s, but its principles trace back to earlier initiatives such as Whyte's 1980 The Street Life Project (1969–1975). These early projects demonstrated how observing, listening to, and involving local communities could create vibrant public spaces tailored to users' needs and aspirations (LeGates & Stout, 2020).

Placemaking is more than an urban design methodology—it is a strategy encompassing public and private spaces' planning, management, and programming. It is rooted in bottom-up processes, encouraging active participation from end users in all design and implementation phases. Schneekloth and Shibley (1995) describe placemaking as a human act of transforming environments into meaningful places where community members engage in thoughtful and responsible actions to create a shared sense of belonging (Buser et al., 2013 in Romeiro, 2017).

Wyckoff (2014) identifies three specialized types of placemaking and two main intervention approaches. The first specialized type of placemaking is *Strategic Placemaking,* aimed at attracting talented workers while creating quality places, creating "talent hubs" and therefore attracting businesses, promoting job creation, and improving the neighborhoods income and quality of life. The specific characteristics and timeframes of Strategic Placemaking projects are slower and bigger in scale, having a bigger impact at the urban level. The second type is *Creative Placemaking*, which refers to a process where partners from public, private, nonprofit, and community sectors collaborate strategically to shape the physical and social character of a neighborhood, town, tribe, city, or region through arts and cultural activities. This approach enlivens public and private spaces, revitalizes structures and streetscapes, enhances the viability of local businesses and public safety, and unites diverse communities to celebrate, inspire, and draw inspiration from one another (Markusen & Gadwa, 2014). The third type is *Tactical Placemaking*, it is derived from the concept of tactical urbanism, also known as DIY urbanism, guerrilla urbanism, and pop-up urbanism. It is described as small-scale, incremental urban design interventions that serve as a foundation for facilitating larger-scale investments (Lydon & Garcia, 2015). This concept implements low-risk trial and error concepts before making greater political and financial commitments. The aforementioned types of Placemaking can be achieved through two main intervention approaches, Projects and Activities (Wyckoff, 2014). *Placemaking Projects* are more permanent types of interventions, while *Placemaking Activities* are less permanent and faster to implement and usually intervene in the "soft" aspects of places.

2.2 Possible Contributions of Design in Placemaking

Design can provide multiple contributions to placemaking, serving as both a process and a tool for fostering connections between people and the places they inhabit. As Manzini, Fuster, and Paez (2023) suggest, designing for placemaking requires viewing the city as a complex system of relationships. This perspective transcends traditional disciplinary boundaries, integrating fields such as architecture and urbanism with emerging domains like service design, interaction design, and graphic design. Such an interdisciplinary approach reflects the inherent complexity of urban systems, which demand the integration of "*hard*" infrastructures—such as physical spaces and structures—and "*soft*" infrastructures, which include relational, cultural, and social dimensions (Landry, 2000). Landry (2000) highlighted that soft infrastructure is particularly critical in this process. It focuses on creating environments that encourage networking, communication, and interaction—what Landry refers to as "third spaces," existing outside the realms of home and work. These spaces are essential for fostering vibrant communities, shifting the emphasis from purely physical developments to cultivating social and cultural connections that enhance the quality and amenities of public spaces.

This duality aligns with Sennett's (2018) distinction between "*ville*" and "*cité*". According to Sennett, the *ville* represents the physical, built environment of the city, while the *cité* refers to the social networks, cultural narratives, and collective meanings that give urban life its depth and vibrancy. Design for placemaking seeks to bridge these two dimensions, ensuring that the tangible aspects of the *ville* are imbued with the relational and cultural richness of the *cité*. By doing so, design creates spaces that support meaningful human interactions and foster vibrant, inclusive communities.

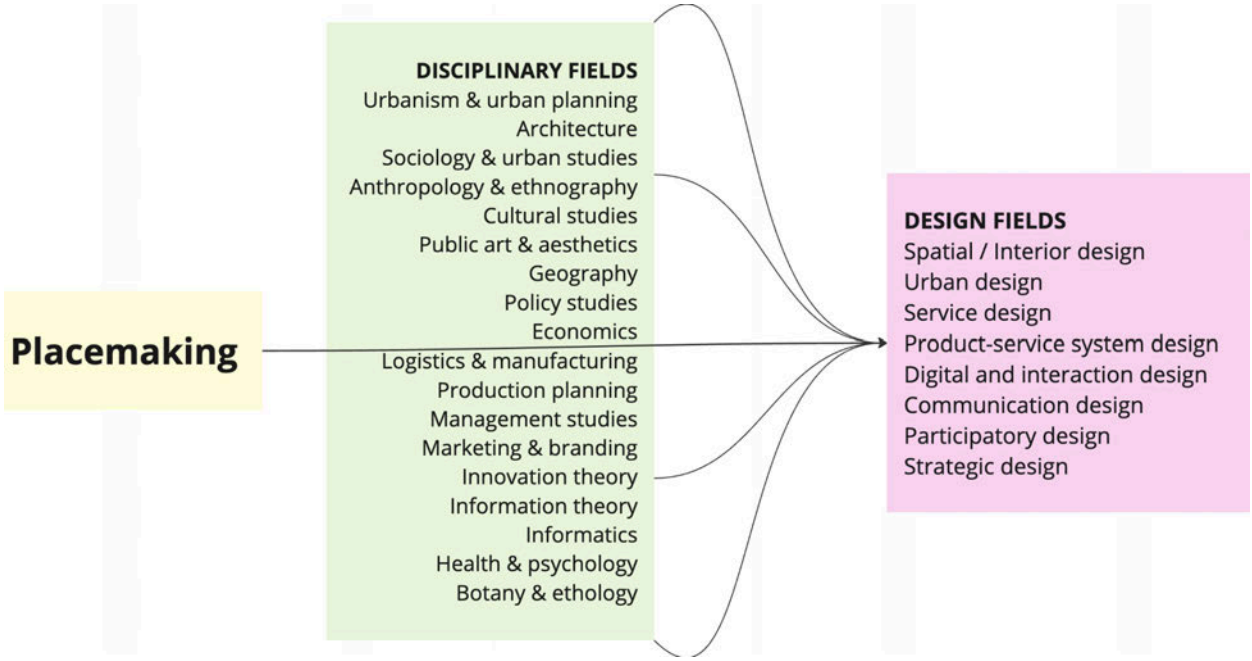

Figure 1. Attempt to position design for placemaking across different fields to explore overlaps and intersections.

The literature review carried out revealed several recurring themes that frame the discourse on design for placemaking. Key aspects among these are:

- **Community-Centricity and Sustainability:** Placemaking aims to maximize communal value and promote sustainability, particularly through socially inclusive practices (Buser et al., 2013; LeGates & Stout, 2020).
- **Participation and Empowerment:** Rooted in collaborative processes, placemaking involves engaging communities in shaping their environments, anticipating or managing conflicts, and so ensuring that design outcomes reflect local needs and aspirations (Schneekloth & Shibley, 1995).
- **Creative and Cultural Integration:** Creative placemaking integrates arts and culture into community development, leveraging these elements as catalysts for urban revitalization and social cohesion (National Endowment for the Arts, 2022).
- **Eventfulness and Social Life:** Placemaking manifests through events and activities, reinforcing the idea that vibrant public spaces are created through active use and engagement (Richards & Duif, 2019).
- **Service design for urban commons: Placemaking has a tight connection with** urban commons, because they can be approached through design. More specifically, they can be, i.e., co-designed and they can find a theoretical framework to address their intangible dimension in the theory and practice of service design (Meroni & Selloni, 2022).

These themes were presented at the inaugural meeting of the Working Group during the Cumulus 23 conference, sparking a dialogue that shaped the group's ongoing inquiry into placemaking practices. This gathering not only established a shared foundation for exploring the intersection of design and placemaking but also set the stage for deeper international collaboration and knowledge exchange. As a premise for the group work, there was the question of whether design, as a multifaceted discipline focused on user experience and meaning, had its own distinctiveness in approaching placemaking, and, therefore, a unique voice.

The broader aim of the Cumulus Working Group was, and still is, to create opportunities for design communities to engage in knowledge exchange and shared reflection. Over the

first year, the focus was building relationships among participants, framing the topic, and cataloging existing initiatives of educational projects and research activities. These efforts were intended to produce a shared, comprehensive framework, as well as collect and review case studies and narratives from across the globe. By focusing on educational contexts, the group sought to understand how design for placemaking is explicitly or implicitly already being integrated into curricula and projects across institutions. This approach provided a grounded starting point, enabling participants to showcase their experiences and perspectives while building a shared knowledge base.

3. The Collaborative Inquiry "Design for Placemaking"

To collect case studies from across diverse educational contexts on the contribution of design in placemaking practices, the researchers set up the collaborative inquiry "Design for Placemaking". This section outlines the inquiry, providing a brief overview of the case study collection and its preliminary analysis.

3.1 Case Study Collection

The case studies were collected through an online survey, inviting design universities and schools to submit projects developed with students. The first call was issued in May 2023 and remained open for seven months.
By this phase's conclusion, 51 case studies were collected from 13 respondent universities across geographically diverse regions, including the UK, Canada, China, Spain, and more. These cases were developed during Bachelor's and Master's programs, thesis projects, workshops, and research initiatives involving students, reflecting the global diversity and interdisciplinary nature of design for placemaking.

Among the 51 case studies submitted through the survey, a significant number came from the same university (Name of the Institution), reflecting a widespread focus on the topic of placemaking. However, despite this concentration and properly balancing this share, the majority of the cases were well-aligned with the key objectives of the CWG, which are:

- Demonstrating a clear connection between design and placemaking practices.
- Representing diverse geographic, cultural, and institutional contexts.
- Involving educational activities or outcomes tied to design disciplines.

The collected case studies were then analyzed using both qualitative and quantitative approaches. Textual and thematic analysis were applied to identify recurring patterns, themes, and insights. Key focus areas included stakeholder involvement, project objectives, methodologies, and impacts. This mixed-methods approach ensured a systemic understanding of the data, capturing both the richness of individual case studies and broader trends across the collection.

The findings from this analysis were first presented at the IASDR conference in October 2023 (Sedini et al., 2023), where a panel discussion provided critical feedback and emphasized the need for further data collection. This iterative process allowed the CWG to refine its inquiry and expand the case study collection, ultimately contributing to a deeper understanding of design for placemaking in educational contexts.

3.2 Case Study Analysis

These results offer valuable insights into how design education contributes to placemaking, emphasizing the different fields of application, stakeholder engagement, and sustainability.

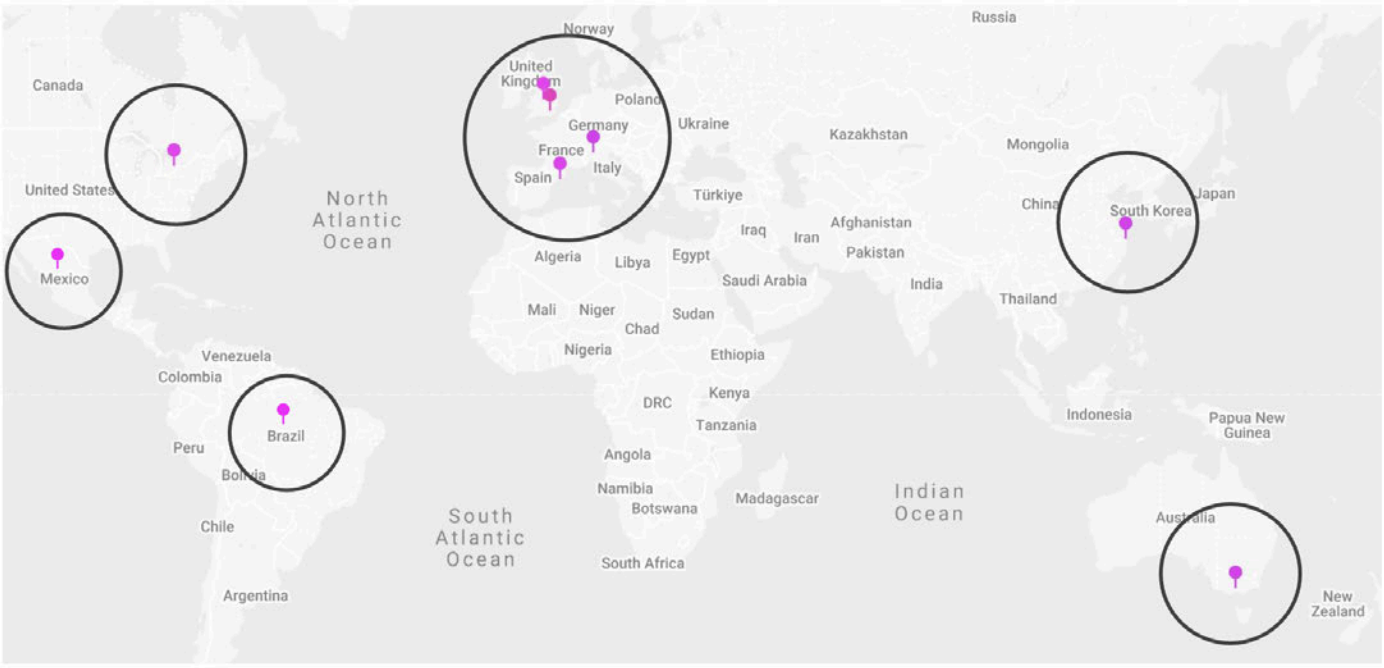

Figure 2. Ranking map of the responding universities. Figure developed by the authors as part of the CWG Design for Placemaking inquiry.

Representing various design disciplinary fields, the submissions highlight significant contributions from spatial and interior design, urban design, communication and visual design, service design, digital interaction, and product design. This diversity underscores the multifaceted essence of placemaking as a domain of design practice. To maintain clarity, the results of the case study collection will be referred to as 'projects.' The term 'project' in our study encompasses student initiatives submitted by respondents as outcomes of their courses and educational programs.

Thematic analysis reveals that the overarching goals of the projects emphasize inclusivity, participation, accessibility, a sense of belonging, and a strong focus on the social dimensions of sustainability. Additionally, the analysis of project descriptions highlights recurring themes such as community participation, social inclusion, heritage preservation, and arts integration. Emerging keywords—such as active ageing, social change, innovation, and reflection—further illustrate these educational initiatives' diverse aspirations and significant impacts.

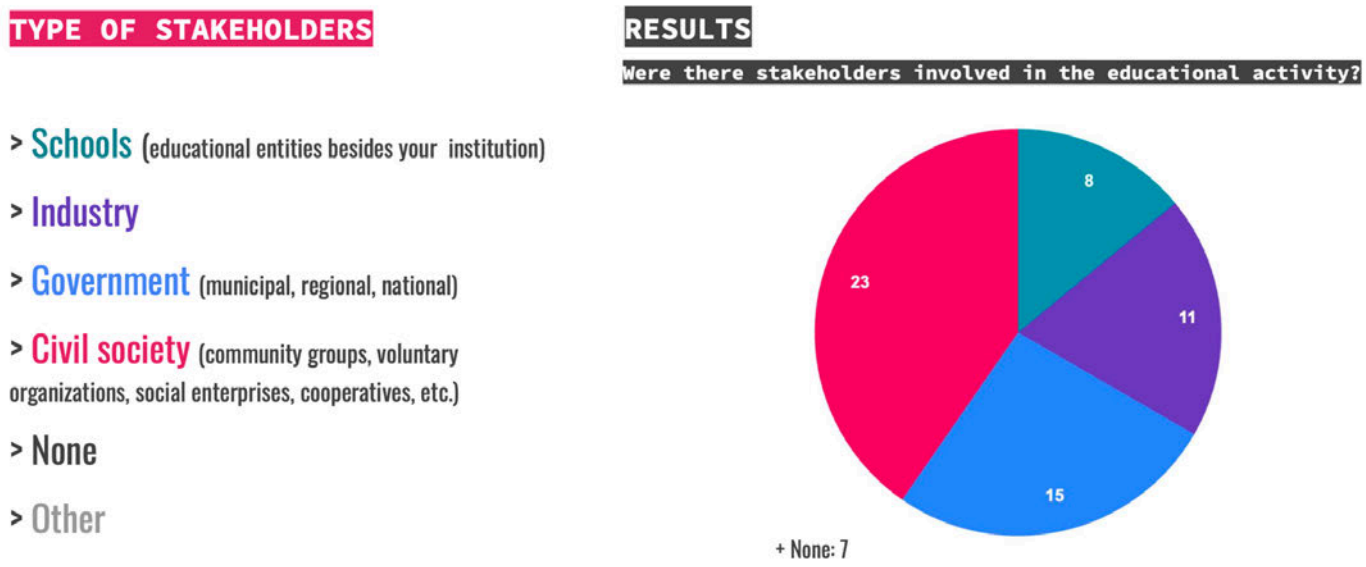

Figure 3. Results for the question: *Were there stakeholders involved in the educational activity? Figure developed by the authors as part of the CWG Design for Placemaking inquiry.*

Stakeholder engagement emerged as a cornerstone of these projects (Fig. 3). Most of them involved multiple stakeholders, including government bodies, civil society organizations, schools, and industries. Notably, only seven case studies reported no stakeholder involvement. This highlights the participatory ethos of placemaking, fostering co-creation and collaboration among diverse actors.

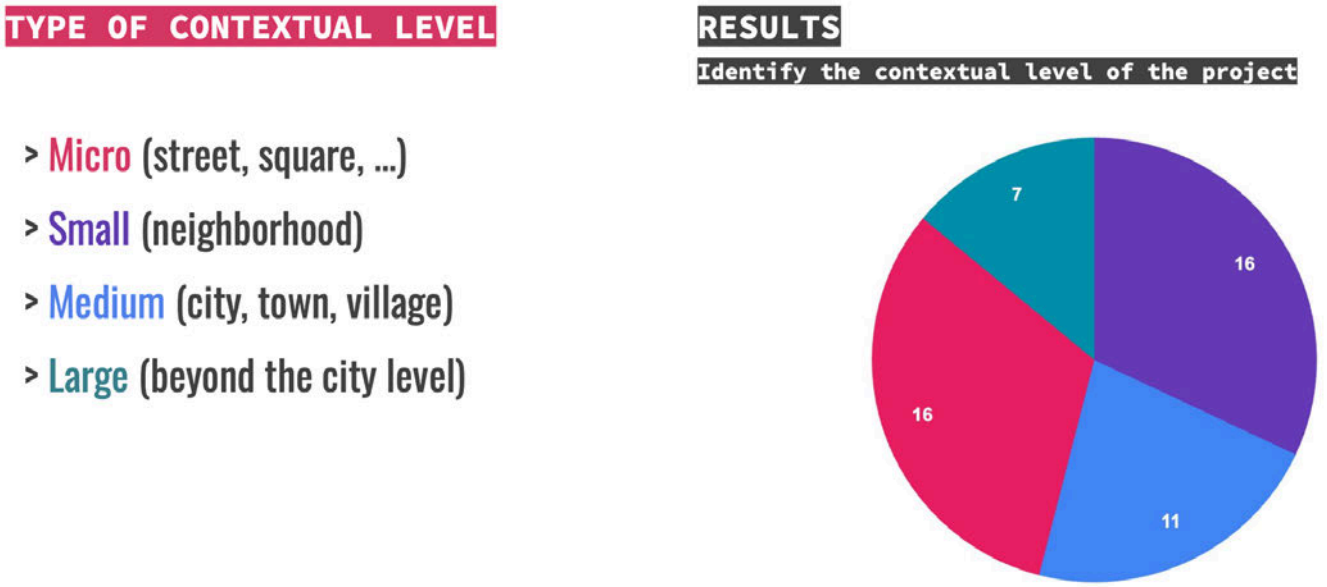

Figure 4. Results for the question: *Identify the contextual level of the project. Figure developed by the authors as part of the CWG Design for Placemaking inquiry.*

The projects strongly emphasize interventions at micro, small, and medium contextual levels (Fig. 4), reflecting the grounded and community-oriented nature of design for placemaking. Large-scale projects were less represented, which aligns with the localized and human-centric priorities of many educational initiatives in this field.

A significant number of case studies reported active involvement of final users throughout the project lifecycle. Specifically, 34 projects included users in the research phase, primarily through interviews and other qualitative methods, while 21 involved them in the

concept generation phase, often through co-design activities. This highlights a strong emphasis on participatory approaches in the early stages of design for placemaking, reinforcing the value of user insights in shaping project directions and outcomes.

Final users were actively involved throughout the project's research, development, and implementation phases (Fig. 5). The research phase predominantly employed primary and qualitative methods, such as interviews, while co-design activities featured prominently in subsequent phases, such as prototyping.

Table 1. Results for the question: *Was the project actually implemented, or will it be implemented?*

Response	**N.**
No	29
Yes and it is still on	10
Yes but it is ended now	6
No but it will	5

Notably, despite the involvement of stakeholders and end-users, most projects did not reach final implementation (Table 1). This reflects the educational focus of these initiatives, which are designed primarily as learning experiences rather than for immediate realization. Nonetheless, some projects achieved temporary or sustained real-world impact, showcasing the potential of educational activities to transcend their original context and deliver tangible results.

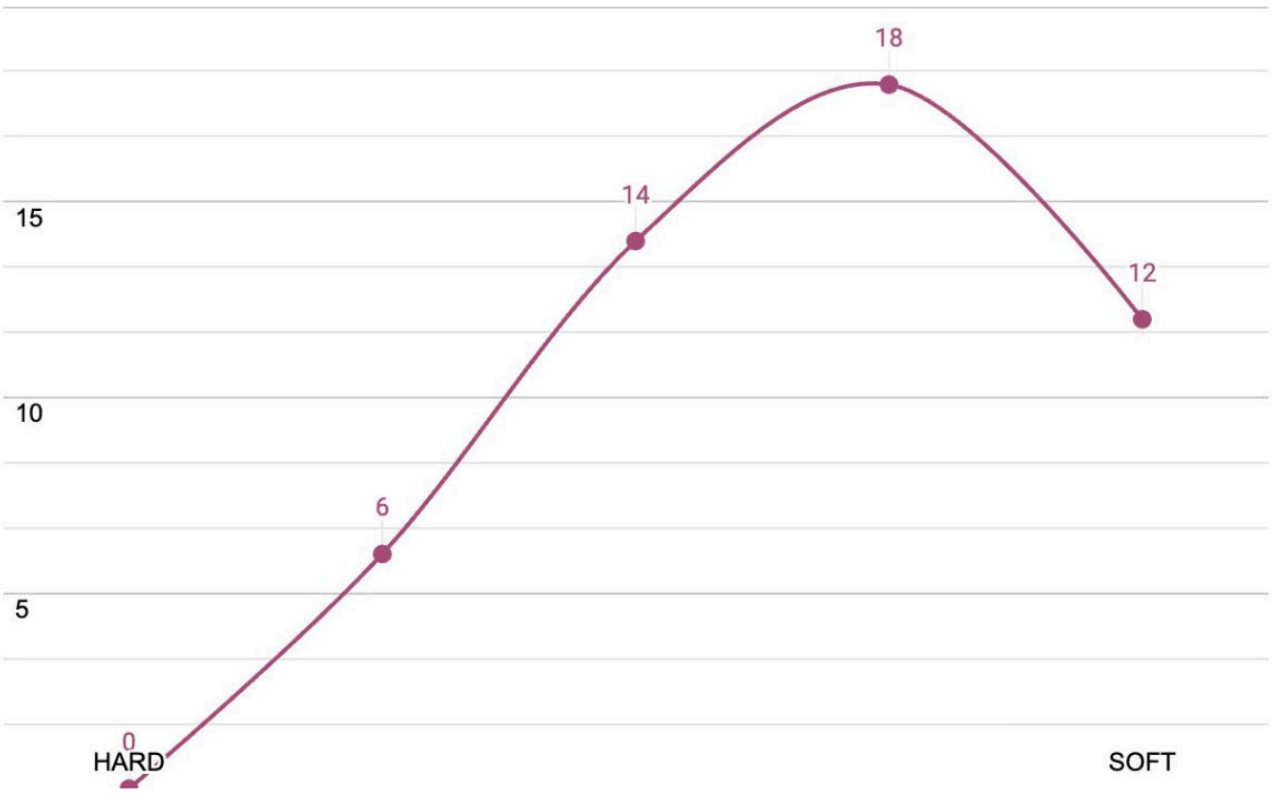

Figure 5. Results for the question: *Did the project focus more on infrastructural aspects (hard) or on cultural, relational, and policy aspects (soft)? Figure developed by the authors as part of the CWG Design for Placemaking inquiry. Figure developed by the authors as part of the CWG Design for Placemaking inquiry.*

A notable observation from the case studies, which recalls the initial discourse about "ville" and "cité", is the distinction between tangible ("hard") and intangible ("soft") outcomes. In fact, while many projects focused on "soft" outcomes, such as fostering relationships or enhancing community engagement, the interplay between these "soft" and "hard" infrastructures is critical to placemaking, because the latter can eventually hinder or enable the former

Before launching the case study collection, the researchers identified a very preliminary, and actually ill-defined, 20 tentative approaches and objectives to define design for placemaking. These were intended as ways of tackling placemaking in design projects, driven by principles, goals or perspectives. They are summarized in Table 2.

Table 2. 20 Key Approaches resulted from the literature review.

	20 Key Approaches	
1	**Community empowerment**	Enhancing local agency and collective decision-making.
2	**Proximity and 15-minute city**	Promoting access to daily needs within walkable distances.
3	**Policy design**	Shaping frameworks that support inclusive and participatory urban development.
4	**Urban transformations**	Driving systemic change in urban structures and dynamics.

5	**Spatial affordability**	Ensuring equitable access to public and private spaces.
6	**Safety and inclusivity**	Designing spaces that are secure and welcoming for all.
7	**Urban regeneration**	Revitalizing neglected or underused urban areas.
8	**Social Entrepreneurship**	Leveraging business models for social and community benefits.
9	**Services**	Designing public or community-oriented service interactions.
10	**Urban spaces (public/private)**	Rethinking how space is shared, owned, and used.
11	**Digital/Spatial interconnections**	Integrating digital tools into spatial experiences.
12	**Citizen activism, guerrilla**	Supporting bottom-up, informal, and spontaneous actions.
13	**Participatory and/or performative art**	Using art to engage communities in place-making.
14	**Participatory design and stakeholder engagement for Placemaking**	Involving users and stakeholders in shaping places.
15	**Tactical urbanism**	Testing small-scale interventions to prompt larger urban change.
16	**Historical perspective and framework**	Embedding historical context into design processes.
17	**Service Logic**	Framing place as a network of value-generating interactions.
18	**Mega events, events**	Leveraging events to activate and transform places.
19	**Multidisciplinarity**	Combining diverse disciplines to address urban complexity.
20	**More than human**	Including ecological and non-human perspectives in design.

At the beginning of the inquiry, the vagueness of these approaches was kept by purpose, to understand if the answers to the survey could have helped disentangle the issue. Hence, the research team decided to share this inquiry with respondents using a Likert scale to address this complexity. Community empowerment, participatory design, stakeholder engagement, and urban spaces and services received the highest ratings (Fig. 7).

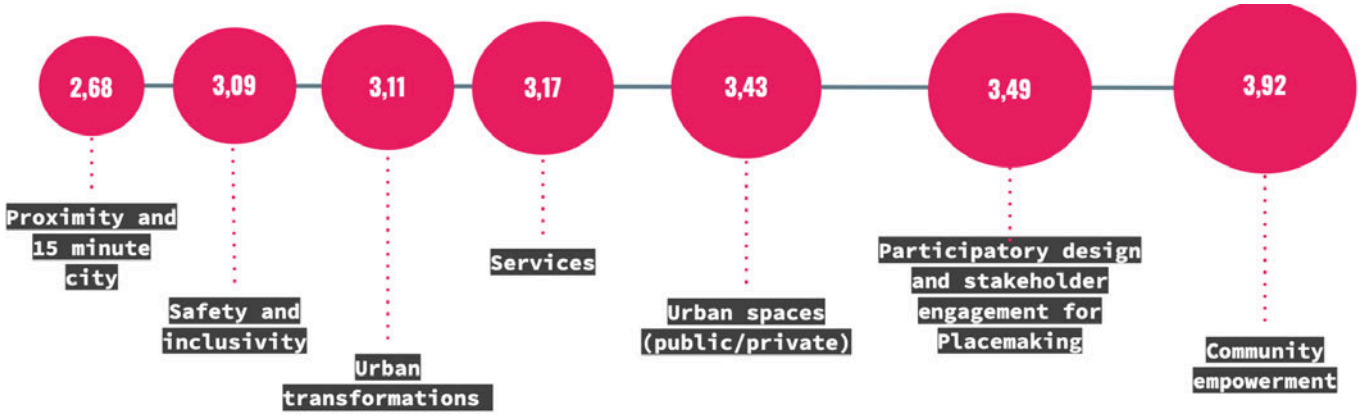

Figure 6. Results for the question: How much does the project consider the following Placemaking perspectives/approaches/objectives? Figure developed by the authors as part of the CWG Design for Placemaking inquiry.

Open-ended responses further highlighted the significance of bottom-up approaches, dialogical design, connectedness, design for remote and rural areas, accessibility, and immersive interaction as essential aspects of placemaking practices.

4. Discussion and Future Directions

Based on the presented case studies analysis, some very preliminary educational implications can be summed up in 3 main possible strategies to be applied in study programs or specific courses that address Design for Placemaking.

First strategy: a focus on users and stakeholders is mandatory. Community engagement emerged as a foundational aspect of successful placemaking projects. According to participatory theory and its application, early engagement is a precondition for fostering community ownership and co-production. Educational activities should include co-creation, participatory design methods, and stakeholder involvement as fundamental competencies that foster a deeper understanding of collaborative dynamics and the social dimensions of sustainability. This aligns with the principles of creative and tactical placemaking identified in the study, where projects originate from people and stakeholder engagement, whether as a result of spontaneous bottom-up initiatives or top-down calls to action. This strategy is particularly important when it comes to project briefs that prioritize community empowerment and spatial affordability goals. Programs should then include specific training on designing (more than) human-centered, accessible spaces through the systematic integration of marginalized voices, so that social equity and safety are actually considered in a project.

Second strategy: the outputs of design projects for placemaking are often of a "soft" kind, that is, interactions and services. For these kinds of artifacts, the design of the "hard" infrastructures is key: physical spaces and environments may foster or hinder certain interactions in a very straightforward way. In fact, they are possible "touchpoints" of service encounters that may happen or not. Service design theory (Vargo & Lusch, 2016) teaches that what matters in service design is the "logic", i.e. the rationale that can connect different artifacts and people for the purpose of providing a service in a use context (Stappers et al, 2023). Accordingly, city spaces can be seen as means for service provision: space embeds strategies, social relations and activities in a dynamic way, and the design of these interrelations together with, or prior to,

the design of the space is a strategy to foster civic engagement and sense of belonging. This is why curricula should strategically balance spatial and service design, teaching students how to integrate physical interventions with strategies that foster servitization, communication, and social interactions in public (or private) spaces. This aspect underscores the multifaceted nature of placemaking, which needs educational programs to integrate multiple design fields.

Third strategy: experiential and field learning must become part of designing for placemaking education programs, so incorporating real-life projects, workshops, and partnerships with local communities and stakeholders to bridge the gap between theoretical knowledge and practical application. While this strategy has proven to be effective across all fields of design, it is particularly demanding and relevant when it comes to urban commons and territorial contexts and requires new competences. On one hand, rapid ethnography is becoming part of every designer's skill set, laying the foundation for solid primary research and fieldwork. On the other hand, this must be complemented by personal relational abilities, social intelligence, and ethical competence, which shape an individual's capacity to understand specific circumstances, situated knowledge, and conflicting interests. Hence, teaching design for placemaking involves developing these abilities in students and creating opportunities for them to practice in real-life settings. For universities and educators, this requires establishing collaborative relationships with local authorities and policymakers, enabling students to gain awareness of territorial challenges and "safely" practice strategic dialogue with real players.

Looking ahead, the CWG aspires to collaboratively prepare a position paper and a set of education formats, and strategies to set a more solid, informed and networked approach to design for placemaking. This work, therefore, will serve as a foundation for future pedagogical developments, fostering a shared understanding of the topic and its multifaceted potential.
In the longer term, the CWG envisions more ambitious initiatives, such as dedicated colloquia, structured exchanges of students and faculty, summer and winter schools, and even international study programs. These aspirations underline the collective commitment to not only explore but also actively shape the evolving field, ensuring its relevance and impact in academic and professional contexts worldwide.

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Designing for a Good Life

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ABSTRACT | This paper explores the notion of the "good life" in design futures, critiquing neoliberal individualism and proposing an ecological, collective, and more-than-human approach. It integrates perspectives from Indigenous philosophies (sumak kawsay), speculative design, and ontological design while incorporating empirical case studies and practical frameworks for implementation. It argues that design should move beyond Eurocentric imaginaries and individualistic future-making towards inclusive, deliberative, and context-specific approaches that acknowledge interdependence across human and non-human actors. In this sense, this article explores how the notion of a "good life" could help to define design practices and the social and political dimension of place making. It also challenges some core assumptions embedded in the notion of future and the idea of design as a world-making practice.

The paper explores the neoliberal approach to the good life, which centers on individual freedom and market success (Brown, 2021). This viewpoint isolates the self from its social and environmental context, suggesting that individuals thrive solely through their own efforts. However, given the climate catastrophe, rising political polarization, and growing inequality, this narrow view seems increasingly inadequate. In this sense, following ideas of Escobar (2019) or Weber (2017), we will argue that we must rethink the idea of a good life, integrating human and non-human relationships, recognizing the deep interdependence between individual well-being and the broader ecological world. This will have a deep impact on design practices as it has been argued in (Álvarez et al, 2024).

Drawing inspiration from thinkers like Gregory Bateson (2000), the paper explores an ecological approach to design. This framework encourages us to unlearn traditional human-centered thinking and reshaping design practices to include more than human concerns (de la Cadena and Balser, 2018). The contribution that this paper makes

revolves around the need to move beyond individualistic approaches, offering a more-than-human way of thinking about the good life. By doing so, the intention is to prove that an ecological approach can be introduced to contemporary design, and that the idea of a good life can guide and shape creative practices towards more plural and integrative ways of worldmaking.

KEYWORDS | Design futures, ecology, more-than-human, interdependence, worldmaking

1. Introduction: Designing Futures

> "Everyone designs who devises courses of action aimed at changing existing situations into preferred ones" Herbert Simon, 1969.

Over the past two decades, since the emergence of so-called speculative design, the notion of imagining futures has gained significant traction within the field of design. Ever since the popularization of the diagram proposed by Dunne and Raby (2013), which suggested that designers should work around possible, plausible, or desirable futures, numerous design contexts and programs have embraced the concept of future-thinking. The idea of being able to influence, shape, or even generate a desired future has undoubtedly been enticing for a field traditionally constrained by briefings, deadlines, and material limitations. A key inference from this framework is the assumption that all possible futures are available for designers to ultimately select the most desirable one. From this perspective, the future might come to be understood as an object of individual preference.

The following article will examine some of the main challenges and issues that design faces when oriented towards the design of futures. To do this, some of the major advances in the field will be discussed, along with the conceptual and political problems that this practice entails. As Ramia Mazé argues, "The future—indeed—has only entered substantially into design discourse relatively recently. Design and other disciplines such as architecture, geography, and geology have long been preoccupied with space rather than time" (Mazé, 2019:23). Despite this, the futurist turn in design is now well established. This can be observed in the growing number of academic programs and educational initiatives in design that incorporate future-oriented perspectives. Notable examples include the Design Futures MDes at the Royal College of Art in London, the Design Futures MA at Lancaster University, the Master of Design Futures at RMIT in Melbourne, and the Speculative Design Futures Certificate at the Institute of Art, Design + Technology in Dublin, to name a few. Recent publications such as *Design and Futures* (Candy & Potter, 2019), *Making Futures Work: Integrating Futures Thinking for Design, Innovation, and Strategy* (Balagtas, 2024) or *Designing Futures: speculation, Critique, Innovation* (Gross & Mandir, 2024) attest to the growth of the subject in the field.

Design researcher Marina Lozada Mondragón asserts that "Design for the future is the term assigned to the grouping of certain traditional and disruptive design practices that enable a more structured, holistic, and above all, distinctive approach to crafting design proposals. These proposals facilitate engagement with the analysis and reflection of

future scenarios, aiming to make effective decisions in the present to bring us closer to the desired outcomes in the future" (Lozada Mondragón, 2024:14). This inevitably raises pressing political questions: What future is preferable? What kind of world do we want to contribute to designing? More importantly, for whom is that future desirable, and who is left out?

As Luiza Prado convincingly argued, a significant portion of speculative design projects reproduce Eurocentric and white imaginaries, disregarding the aspirations and needs of large segments of the global population (Prado Martins, 2014). It is crucial to acknowledge the biases of gender, class, and race embedded in such projects while also examining the stereotypes and lived realities they contribute to legitimizing and perpetuating over time.

The concern for thinking about the future through design encompasses debates on the sustainability of the planet in the face of an unprecedented climate crisis, the role of digital technologies and their hegemonic influence on daily life, questions about the future of public policy and institutional organization, and a rich legacy of projects on urban design, planning, and modes of inhabiting cities. In this sense, when design enters the realm of futurology, it shifts from referring to a set of discrete practices to becoming a preventive mechanism against multiple potential threats—essentially, a broad-spectrum antibiotic. As design theorists Stuart Candy and Kelly Kornet argue, "Efforts to map images of the future have begun to be systematically articulated to a full array of strategies for mediating them, and designers are increasingly exploring futures in the plural as well" (Candy and Kornet, 2019:4). This plurality of futures reflects the diversity of design practitioners, each aspiring to inaugurate a new future embedded in their practices, proposals, and prototypes. The multiplicity of individual worldviews contributes to the proliferation of potential future scenarios.

The challenge, then, lies in articulating collective or shared imaginaries of desirable futures. That is, shifting design practices from speculative exercises that warn about the consequences of present decisions to deliberative spaces where different people or communities can collectively negotiate the kinds of lives they wish to share. In this context, both the spheres in which design can operate and the futures it can generate have expanded significantly. The following section will explore some of the inherent problems and contradictions of linking design to the production of futures.

Ontological Design

In recent years, an ontological perspective on design has gained prominence, a notion insightfully captured by Anne-Marie Willis (2016). From this viewpoint, designed artifacts are not merely representational objects. They are not material entities serving to transmit, mediate, or represent the world. Nor are they mere spokespersons of certain human ideas or intentions. Rather, artistic and design artifacts are ontological entities; they actively contribute to producing the world they inhabit. In this sense, they are objects that deploy politics, consolidate or challenge aesthetics, engage with markets, and either reinforce or contest hegemonic imaginaries and shared sensibilities. As material entities, they shape realities and condition the world in which we live. Only by understanding the ontological dimension of art and design can we grasp how these artifacts both produce and are produced by reality, how they influence and are influenced by the subjects, social contexts, and environmental conditions in which they exist.

Researcher Tony Fry asserts that "There is not a single thing around us that has not been designed. All designed objects have certain consequences, whether minor or major (...). Designers design within a world that is itself the result of design activity, and that in turn

designs their actions and objects" (Fry, 1999:5). This argument builds on an earlier formulation by Anne-Marie Willis, gradually leading to the idea of the designer as a world-maker. If every design artifact has the capacity to shape the world it will inhabit, we must ask: what kinds of worlds do we want to reproduce, and which should we seek to avoid? This perspective aligns with the ideas of Arturo Escobar, who emphasizes the need to move away from the concept of a single, dominant world and instead design for a pluriverse (Escobar, 2018). Challenging Victor Papanek's idea of designing for "the real world," Escobar questions which of the worlds we live in is the most real. If the "real world" Papanek refers to is a modernist and Eurocentric construct, Escobar prompts us to ask, "Can design be extricated from its embeddedness in modernist unsustainable and defuturing practices and redirected toward other ontological commitments, practices, narratives, and performances?" (Escobar, 2018:15). In a similar vein, scholars Marisol de la Cadena and Mario Blaser call for an escape from what they term "a one-world world" in order to design for alternative possible worlds (de la Cadena & Blaser, 2018).
Thus, the ontological perspective compels us to interrogate both the material consequences of design practices and the worldviews we have internalized from a Eurocentric perspective. It urges us to recognize and engage with other suppressed worlds and alternative horizons of desire that have been excluded from the dominant narrative of the world in which we live.

2. The Future as Individual Choice

One of the major issues with future based design practices is that they generally present the future as if it were the result of individual decisions. As if it depended entirely on a demiurge hand capable of imagining, designing, and determining that future. Speculative design, with its use of fiction to alert us or open conversations about the less desirable consequences of consumer objects or contemporary social systems, used the future as a kind of diachronic time that prompted us to empathize with the consequences of decisions made in the present.

Author Wendy Brown has effectively explained the correlation between the proliferation of neoliberalism and the idea that life is determined by individual preference (Brown, 2019 and 2021). For Brown, growing neoliberal individualism poses a threat to democracy, as in this framework, citizens cease to be collective agents and become atomized actors, reducing the capacity for political action against inequality. This hinders deliberative action and jeopardizes the collective ability to debate and find solutions or consensus frameworks for collective problems. Brown argues that this economization of existence erodes the foundation of democratic citizenship and the concept of the common good, leading to the disappearance of "homo politicus" and weakening popular sovereignty. The author contends that this process not only affects individuals but also transforms institutions, such as public universities, which are invaded by neoliberal logic.
It would be important to analyze how much of this logic is transferred in the trend of designing futures. Especially how it materializes in the figure of the individual designer who, through personal preferences, ends up identifying a future scenario as preferable over other possible futures and how it ends up reproducing unipersonal worlds in which the ability to deliberate or debate collectively is absent.

Cultural critic Jaron Rowan has analyzed how an aesthetic fracture has become hegemonic, reproducing the perception that the subject lives disconnected from their environment or the communities in which they were raised and belong (Rowan, 2024). This aesthetic fracture has important consequences in how social institutions are

narrated and organized, ultimately reproducing the fiction of individuality. In this sense, he invites us to "break with the aesthetic fracture that leads us to dissociate culture from other areas such as the political or social. It is key, in this sense, to blur the artificial boundaries that separate the subject from the communities they inhabit and break with individualizing views to understand how cultural practices respond and always occur in specific contexts. This leads us to focus on power relations, economic conditions, and material limitations that determine these contexts" (Rowan, 2024:49). In this sense, the growing trend toward individualization, as analyzed by Brown, is reinforced by an aesthetic bias that obscures the connections and relationships that shape the subject within the world. Rather than viewing history as a dynamic interplay of material, economic, symbolic, and human forces, an individualized and neoliberal perspective may suggest that the future is solely determined by individual choices, detached from the social and material conditions in which they occur.

All of this forces us to rethink the idea of designing futures as a unipersonal activity or one that can be assumed from the design studio. It compels us to reconsider whether behind this idea lies a neoliberalized subjectivity that considers that the future can be articulated in relation to individual preference. This should lead us to think about how the future could be conceived if it is not the result of a set of non-linear decisions, actions, and dynamics over which no individual subject has total agency. This would imply moving away from the narrative of future design as an idealistic activity to force us to rethink the very notion of the future, which can only happen in a non-linear way and not anchored in unipersonal decisions.

3. Future Parliaments

It could be argued that one of the main challenges associated with the idea of designing futures is the lack of deliberative or debate spaces where we can collectively question what futures we want to contribute to creating. When future-making practices become individualized, as we have seen, it may appear that the future depends solely on personal preferences or individual decisions. This detaches the idea of design from the idea of politics, understood as a practice of agreements and tensions between individual wills and collective needs.

Theoretically, scholars have articulated the need to create new discussion forums and deliberative spaces that include the voices of those who have historically remained unheard. In this context, proposals emerge urging us to invite both human and non-human entities that collectively shape their futures into these discussions. The philosopher Bruno Latour famously proposed the idea of a "parliament of things" as a new deliberative space where the needs of non-humans could be addressed and heard (Latour, 1986). This concept challenges narratives surrounding the subject-object divide and the centrality of human agency, deeply rooted in humanist thought. While partially intended as a provocation, this idea reminds us that, in future-making processes, more actors are often excluded than included.

Similarly, philosopher Isabelle Stengers, through her notion of "cosmopolitics," invites us to articulate new forms of politics capable of giving voice to communities—both human and non-human—concerned with the decisions we make about issues affecting our collective future (Stengers, 2010). This notion opposes the idea of a singular scientific truth dictating political decisions, emphasizing the importance of uncertainty and dissent. Consequently, breaking away from regimes of absolute truth and cosmologies centered on rational, Eurocentric visions compels us to articulate heterogeneous ways of thinking and to facilitate dialogue between different worldviews. This perspective leads us to work within

an ecology of practices (Stengers, 2005), capable of integrating diverse ways of understanding and making sense of reality. From this standpoint, speaking of the future—or futures—in a singular sense appears reductive, as every future is articulated within a specific worldview. The ability to integrate multiple worldviews presents a vast and necessary political challenge if we aim to move beyond closed future frameworks dictated by hegemonic imaginaries.

In his recent book *Designing for Interdependence* (2022), designer and author Martín Ávila urges us to bring these ideas into practice by designing for more-than-human worlds. The core concern of his work invites us to reflect on what it would mean to design while considering the needs and possibilities of more-than-human entities and realities. In other words, how would design look if it shifted its focus away from human needs to create spaces for listening to and granting agency to non-human entities? For instance, how could we design with animals or plants? Ultimately, Ávila encourages us to explore and prototype non-anthropocentric design approaches that foreground notions of mutualism, interdependence, and relationality with non-human entities. In this sense, his work serves as an invitation to rethink possible ecologies of design and their articulation within a world marked by heterogeneity and complexity.

Despite the increasing problematization of singular perspectives, in practice, we continue to face a lack of concrete spaces or solutions for collectively deliberating or negotiating the kinds of lives, cities, and worlds we wish to inhabit. The interdependence of life forms and communities compels us to radically rethink who should be present in the design of futures and what kinds of voices, imaginaries, and worldviews should be integrated into such processes. Design researchers as Gabriela Baron have developed interesting tools as the Design4Conservation toolkit, which addresses these issues providing specific methodologies to integrate and take into account different voices and needs. In this sense there is evidence that these debates do not only occur on a theoretical level but there are specific practices acknowledging the importance of non-western ways of thinking and including the voices of more-than-human actors in participatory design projects (Barón, 2023).

4. A Good Life for Whom?

Following the debates above, we argue that in order to reach a consensus on collective futures, we must first revisit one of the fundamental questions of moral philosophy: what constitutes a good life? Despite the significance of this question, few design spaces or critical environments engage with it in all its complexity. In Latin America, particularly in Bolivia and Ecuador, the concept of *buen vivir* (good living) has gained political relevance. As Walsh (2009:214) describes it, *buen vivir* represents "the communion between nature and human beings, and their way of conceiving and constructing life based on complementarity, relationality, and solidarity as an ethic of coexistence and co-living." Though this notion gained political traction and was even enshrined in Ecuador's constitution, it never fully entered political debates in Europe.

There is some controversy over the origin of the term, as evidenced by the Kichwa linguist and analyst Armando Muyolema, who argues that "Sumak Kawsay seems to me the most surprising invention of tradition" (Muyolema, 2019). Nevertheless, it was one of the conceptual pillars that supported Rafael Correa's government.

According to the National Plan for Buen Vivir 2009–2013, Buen Vivir consists of "the satisfaction of needs, the achievement of a quality life and a dignified death, the ability to love and be loved, the healthy flourishing of all individuals, in peace and harmony with nature, and the indefinite continuation of human cultures. Buen Vivir implies having free

time for contemplation and emancipation, and ensuring that the freedoms, opportunities, capacities, and real potential of individuals expand and flourish, allowing them to simultaneously achieve what society, territories, diverse collective identities, and each individual—viewed as both a universal and particular human being—value as a desirable life goal (both materially and subjectively, and without exerting any form of domination over others)."(Vanhulst, et all. 2020).

Questioning whether we are living a fulfilling life pushes us beyond political agendas and into concerns typically explored in moral philosophy. To answer this, we must ask: what exactly is a good life? What defines it? And, more importantly, why is it so likely that we are not living it? To assert that our lives are good, we must feel that they have meaning—that is, we must adopt certain values that guide our actions in a specific direction. These values are inherently social; they shape how we organize ourselves, what we prioritize, and how we relate to others. "El buen vivir" includes human and non-human lives and their interdependence on the basis of a programme for collective wellbeing, challenging liberal ideas of happiness and individual prosperity. This differs from western traditions of moral philosophy in which individual and emotivist versions of what a good life implies have become prevalent (Macintyre, 2020). This is contributing to the difficulty at defining shared values or the ability to define a good life in common.

In this sense, we must ask what a good life is, acknowledging, as ecologist Jorge Riechmann argues, that life must be understood and agreed upon "for all, not just for me or my own" (Reichmann 2024:72). Moving beyond individualistic perspectives is essential for anyone reflecting on the world we want to inhabit and the kind of lives we wish to lead. Opening-up to new cosmologies and ways of thinking allows us to rethink the "cosmo-ecologies" of design, expanding notions of care and well-being (Uğur Yavuz et all, 2024).
A More-Than-Human Good Life

If we cannot define a good life without considering the lives of more-than-human beings or the environments we inhabit, we need tools that reconnect human concerns with the needs and possibilities of the planet. Ecology—understood as the ability to identify and work with a vast number of interconnected heterogeneous entities and phenomena—offers a crucial framework. Bateson (2000) notes that due to disciplinary and academic limitations, we tend to analyze separately three deeply interconnected spheres of life: individual human existence, social reproduction, and biological or environmental sustainability. These three complex systems shape and condition one another.

For Bateson, the root of our problem lies in an epistemic bias—beginning with the subject-object divide, the artificial separation of humans from their environments, and the entrenched culture-nature dichotomy. Liberal-Enlightenment interpretations have led us to believe in the inherent independence of the subject, ignoring the social, energetic, and biological networks that shape and define us. He argues that humans are systems embedded in broader systems that condition and give meaning to their existence. Following this reasoning, scholars have called for an ecological perspective in design practices (Álvarez et al., 2024), urging us to embed design firmly within the communities and biophysical environments where it operates. Instead of projecting fictional scenarios about the worlds we wish to inhabit, an ecological perspective compels us to critically examine the present world through the lens of complexity, fostering connections between beings and environments.

Expanding on this notion, philosopher Timothy Morton (2021) argues that art offers access to the phenomenal world in ways that complement and enrich our understanding of reality. He encourages us to explore partial truths revealed through aesthetic experiences,

suggesting that what we perceive as causal relationships are often aesthetic encounters. Art thus becomes a means of attuning to the world, breaking the illusion of human exceptionalism and reaffirming our place in a more-than-human reality.
Ultimately, Morton urges us to embrace stillness, patience, and deep listening, moving away from reactivity and the pressure to respond immediately to external circumstances. Instead of guilt, anxiety, or urgency, he reminds us that we have always been ecological beings. Andreas Weber (2017) similarly calls for rethinking our aesthetic connection to the world, recognizing the wonder of inhabiting a universe of dense relationships and improbable connections. In this sense, aesthetics, ecology, and an awareness of complexity become essential tools for living fully in the present rather than using the future as a means of disconnecting from material life on Earth.

5. Complex Practices

The artist and designer Serafín Álvarez, in his series of works *A Synthetic Forest Whithin a Stone*, explores these complex connections between beings, compelling us to marvel at the proliferation of hybrid entities that resist categorization or naming. According to Álvarez, this proposal involves "the conception, design, and prototyping of a small digital world that feels alive, using video game technology to produce a miniature ecosystem populated by artificial life forms that act autonomously and unpredictably[1]." Through his work, he challenges the divisions between nature and culture, as well as between organic and synthetic beings, urging us to move beyond certain frameworks of understanding reality inherited from European modernity.

By creating devices that integrate digital screens into large stones, he prompts us to reflect on the boundaries between biology and geology, while proposing a contemplative experience centered on forms of synthetic organization and emergence. He also invites us to think beyond human time scales, opening the question of what a future without humanity looks like. By creating artificial beings that share biologic and synthetic traits, one can not now exactly where in time these beings exist, as he writes “These artificial life beings behave autonomously, interact with each other and undergo diverse biological processes in real time. A speculative simulation that imagines possible life forms beyond our planet, perhaps also beyond our time”.

Similarly, Paula Bruna, in projects such as *Embolismo por Soleá* and *Plantocene*[2], compels us to reconsider the links between human action and the well-being of the plant world around us. As she writes, "*Plantocene* is an artistic investigation into the confrontation between the plant kingdom and human society, questioning the hegemony of our species and presenting images that evoke a para- or post-human scenario. The project's name arises in opposition to the Anthropocene (a recently distinguished geological epoch whose protagonist is the human being and their impact on the planet)." Through her work, she blurs the boundaries between human action and plant life, highlighting forms of interdependence and mutual affectivity. In this sense, her work makes visible the connections and relationships that have been rendered invisible by world descriptions based on rigid taxonomies and disconnected categories.

These practices displace the human as the central agent of world-building, opening space for more-than-human perspectives and agencies. By envisioning hybrid ontologies that resist clear distinctions between the natural and the synthetic, they

[1] https://serafinalvarez.net/unbosquesinteticodentrodeunapiedra.html
[2] https://paulabruna.com/plantoceno/

cultivate a more intricate and nuanced understanding of ecological systems—one that acknowledges the entanglement of diverse, autonomous life forms. Through their engagement with deep time and speculative posthuman futures, these works unsettle the anthropocentric temporal scale, encouraging us to imagine scenarios in which the future is no longer exclusively human-centered. In doing so, they reinforce the necessity of rethinking subjectivity itself—shifting from individual human dominance to networks of multispecies interdependence. This reorientation is essential for designing ecological futures that are truly inclusive.

By going beyond an ethnocentric future, these projects invites us to continue reflection on more complex visions of reality—ones not centered solely on human well-being. Their projects, alongside those of designers such as Martín Ávila, open the possibility of imagining more intricate speculative scenarios in which the interdependence between human and more-than-human lives compels us to radically rethink future concepts traditionally centered around human welfare.

6. Conclusions

In conclusion, we can affirm that the rise of future-oriented design presents both significant opportunities and challenges for the discipline of design and society as a whole. In summary, the ontological perspective of design compels us to recognize that design artifacts are not mere objects but entities that actively contribute to the production of realities. This entails a great responsibility for designers as "world-makers." The political question of what kind of world we are contributing to creating thus aligns with the question of what futures we want to inhabit.

In this way, future-oriented design raises important questions about who holds the power to imagine and shape possible futures. It is crucial to address the reproduction of Eurocentric imaginaries and the lack of diversity in these visions of the future. At the same time, there is a danger that future design becomes an exercise in individual preferences, reinforcing neoliberal tendencies that erode collective action and democracy. In this sense, it is important to prevent working with future-oriented frameworks from leading to a disengagement with present challenges. For this reason, it has been argued that overcoming the "aesthetic fracture" mentioned before requires an approach that acknowledges the interconnections between design, culture, politics, and society.
In conclusion, while future-oriented design provides valuable tools for imagining and potentially shaping desirable futures, it is imperative that designers and educators carefully consider the ethical, political, and social implications of their work. The challenge lies in developing design practices that are inclusive, that foster collective deliberation, and that recognize the complexity of the social and ecological systems in which we operate. Only in this way can we aspire to design futures that are truly sustainable, equitable, and desirable for all.

This article has identified some of the main issues associated with the notion of future design. Notably, the tendency to generate individualistic futures that do not require negotiation or debate. The inability to define deliberative spaces where we can reflect on what constitutes a good life from a holistic perspective—one that includes the interests of more-than-human beings with whom we share the planet. It also opens new avenues to be explored in order to find spaces and practices in which collective negotiations about the future can take place.

Finally, there is a concern that future design comes at the expense of understanding the present in its complexity and from a perspective capable of articulating many of the

invisible connections that shape it. Ultimately, if we are unable to articulate the question of what a good life is—including other cosmologies and more-than-human lives—we risk perpetuating imaginaries, institutions, and ways of life that are currently being deeply questioned.

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DESIGNING FOR MULTISPECIES CITIES: ENVISIONING COEXISTENCE EXPERIENCES BETWEEN HUMANS AND PLANTS.

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ABSTRACT | Urban ecosystems have been significantly impacted by anthropization, with cities now often seen as toxic environments for both humans and other lifeforms. This issue – also framed by the 11th (Sustainable Cities and Communities) and the 15th (Life on Land) United Nations Sustainable Development Goals - arises mainly from human-centred design, which has created contexts that are often extremely hard to tackle, particularly in terms of health and well-being. Cities are generally considered as places made by and for people, "artificial" environments that, since the creation of the Greek polis, have deliberately excluded plants, animals, and other non-humans from the social and political realm (Escobar, 2019). However, over the past few years, designers, city planners, as well as policymakers, have been working to incorporate nature-based solutions into urban design, reintroducing trees and other non-human lifeforms to promote ecological sustainability. Concepts such as the "Multispecies city" (Houston, 2019) – or the "More-than-human city" (Heitlinger et al., 2024; Franklin, 2017) - are offering new perspectives for cohabitation and coexistence, prioritizing the needs and well-being of non-human entities, both organic and inorganic.

At the same time, emerging knowledge in Critical Plant Studies and empirical research into plant intelligence are reshaping our understanding of plant behaviour, interaction, and communication. These findings challenge the traditional view of plants as passive and silent, instead highlighting their active and political roles in ecosystems. In this framework, "Multispecies Design" (Wakkary, 2021; Westerlaken, 2021; Roudavski, 2020) acknowledges that plants – along with other non-human agents – have agency, and their inclusion in design processes is vital for addressing today's environmental crises.

This shift requires a new approach to design that fosters collaboration between multiple species as part of the solution to sustainability challenges.

The paper presents insights from "Designing in a Multispecies World", a brand-new elective course launched at the School of Design of Politecnico di Milano University, which places the relationship between humans and plants in urban environments at the heart of this evolving design paradigm. The course encouraged students to rethink urban environments as “assemblages” of different entities, rather than solely human-made spaces. Through the development of 35 projects, each exploring a specific multispecies relationship, students designed everyday experiences involving humans, plants, and other non-humans within the city of Milan (Italy). They were challenged to shift their perspective as designers, moving beyond the Cartesian mindset that divides the world into the “artificial” and the “natural” realm. Over three phases, students engaged in: 1. multispecies ethnography (using practices of *decentering* and *attuning* to connect with non-human actors), 2. active reflections on the need for legal and political recognition of plants (through a speculative/performative design activity), and 3. future relationships between plants and humans in the city (designing a *terrestrial experience*). Students not only explored new design paradigms but also envisioned urban-life scenarios where humans and non-humans can continuously interact, forecasting experiences of multispecies care for inclusive futures.

KEYWORDS | MULTISPECIES DESIGN, SPECULATIVE DESIGN, CRITICAL PLANT STUDIES, DECENTERING, POST-ANTHROPOCENE

1. Introduction

Urban ecosystems have been profoundly affected by anthropization, with cities now frequently regarded as inhospitable environments for both humans and other life forms. This issue — highlighted by the 11th (Sustainable Cities and Communities) and 15th (Life on Land) United Nations Sustainable Development Goals — primarily stems from human-centered design, which has shaped urban contexts that are often challenging to navigate — particularly in terms of health and well-being. Historically, cities in the western part of the world have been conceived as human-made and human-oriented spaces, artificial environments that have deliberately excluded plants, animals, and other non-human entities from social and political domains (Escobar, 2019). However, in recent years, designers, urban planners, and policymakers have been increasingly integrating nature-based solutions into cityscapes, reintroducing trees and other non-human lifeforms to promote ecological sustainability. Concepts such as the “multispecies city” (Houston, 2019) and the “More-than-human city” (Franklin, 2017; Heitlinger et al., 2024) are offering new perspectives on cohabitation and coexistence, prioritizing the well-being and agency of non-human entities, both organic and inorganic. Yet, designing with non-human agents remains a complex challenge (Head et al., 2017), fraught with ambiguity, biases, and limitations.

Within this context, plants play a crucial role in sustaining urban ecosystems as they provide environmental, social and economic benefits for people. However, despite their ecological significance, they are still often perceived as “ontologically inferior” to humans

(Gibson & Baylee, 2018). Throughout history, the way we have understood plants from a design perspective has been deeply shaped by anthropocentric reasoning, frequently reducing them to mere resources serving human needs (Sandler, 2018; Turner-Skoff & Cavender, 2019; Višak, 2018). This perspective is rooted in the long-standing belief that the creation of what we call "artificial environments" is an exclusively human skill (Nelson & Stolterman, 2014). However, in recent decades, scientific disciplines have undergone a profound shift, challenging the traditional view of plants as passive, voiceless entities (Plumwood, 2002) and instead recognizing them as active, political agents capable of shaping and interacting with their surroundings (Marder, 2013).

This transformation has been largely driven by Critical Plant Studies — a transdisciplinary field between the environmental humanities, plant sciences, art and aesthetics, philosophy, literature and ethics (Gibson, 2018; Laist, 2013; Lawrence, 2022; Marder, 2013) — and empirical research into plant intelligence, reshaping our understanding of plant behaviors. The recognition of plants as "individuals" (Calvo, 2007) — that is, as agents with distinct roles and standing — is closely linked to the notion of intelligence, traditionally regarded as an exclusively animal (and therefore human) trait (Segundo-Ortin & Calvo, 2022). While biologist Charles Darwin first postulated plant intelligence in the 19th century — particularly concerning root systems and their role in directing movement (Viola & Mancuso, 2015) — only in recent years research has provided compelling evidence to support this intuition (Gibson & Baylee, 2018). Emerging studies in Plant Neurobiology — a discipline investigating how plants acquire, process, and respond to environmental stimuli (Brenner et al., 2006; Mancuso, 2018) — are now dismantling long-standing knowledge barriers, revealing extraordinary insights into plant cognition and behaviors. Unlike animals, plants lack a central nervous system or brain; instead, their functions are distributed throughout their entire structure, decentralizing cognition (Calvo et al., 2017; Segundo-Ortin & Calvo, 2019). Plants interact with their environment using biotic and abiotic signals, both above and below ground, to determine optimal survival strategies (Gagliano et al., 2018; Pelizzon & Gagliano, 2015).

Even before formal scientific recognition of plant intelligence, fields such as Anthropology and Philosophy had already begun acknowledging plants' inherent worth (Sandler, 2018), fostering discussions about their agency and their vital role in global ecosystems. This shift has even prompted reflections on their political representation. Nevertheless, the field of Design has been relatively slow to embrace this evolving perspective, often maintaining an anthropocentric approach that limits the significance of plants to their advantage for humans. Within this evolving framework, "Multispecies Design" (Roudavski, 2020; Westerlaken, 2020) recognizes that plants, along with other non-human agents, possess agency and that their inclusion in design processes is essential for addressing today's environmental crises. This shift calls for a new design paradigm that fosters collaboration across species to create sustainable and resilient urban environments, moving beyond human-centered design, which has proven inadequate for addressing the complex challenges of the contemporary world (Forlano, 2017; Giaccardi et al., 2025; Tironi & Garretón, 2024).

This paper presents insights from Designing in a Multispecies World (DMW), a newly introduced elective course at the School of Design of Politecnico di Milano University that places human-plant relationships in urban environments at the heart of this emerging design approach. The course challenged students to reconceive urban spaces not as exclusively human-made domains but as dynamic assemblages of diverse entities. Through the development of 35 projects — each exploring a specific multispecies

interaction — students designed everyday experiences that engaged humans, plants, and other non-humans within the city of Milan (Italy). By shifting their perspective beyond the Cartesian division between the *natural* and the *artificial*, students were encouraged to embrace more inclusive and ecological modes of designing, challenging the process with methods such as "noticing" (Tsing et al., 2017), "attuning" (Abbott, 2021; Lynch & Mannion, 2021) and "decentering" (Forlano, 2016; Giaccardi et al., 2016; Nicenboim et al., 2025).

2. Context and objectives

Designing in a Multispecies World (DMW) course is part of the School Bachelor programme, targeting 35 third-year students from different design disciplines including Interior (x3), Fashion (x8), Communication (x7), and Product (x17). The course is one of the few available in English at undergraduate level, which has resulted in a diverse mix of both national and international students (x23 Italians, x7 Erasmus students, x5 international programs extra EU), bringing together a range of linguistic, cultural, and interdisciplinary backgrounds. DMW is an elective course lasting one semester, promoting collaboration and transdisciplinarity in a field – More-than-human and Multispecies Design - that is constantly rising only in the last years. The course was created in response to the growing need to provide answers (and develop scenarios) for a world in constant transformation. While environmental concerns have been present since the 1970s, the sense of urgency surrounding these issues continues to intensify, exacerbated by unclear and often counterproductive global policies. Within this framework, the fluid nature of design plays a crucial role in equipping new generations with the skills to question the future and envision new pathways for coexistence in an increasingly complex world.

At the same time, the exchange of knowledge within academic settings extends beyond the boundaries of the university itself. Discussing multispecies cities also means actively engaging with these environments, creating opportunities for field research. For this reason, DMW course combines traditional in-class lectures with experiential learning through field activities conducted at Off Campus Nolo, the living lab of Politecnico di Milano located in the Nolo neighborhood of Milan. Within Off Campus Nolo, the POLIMI DESIS Lab research group promotes action-research initiative, community co-design and innovative teaching, exploring themes such as proximity, circular economy, fair food access, and More-than-human Design to foster sustainable, equitable and inclusive transformations in the neighborhood (Fassi & Vergani, 2024). Throughout the course, Off Campus Nolo has become a headquarters for students, giving them the opportunity to conduct on-field explorations, interact with the local human and non-human community and experiment with new forms of experiential learning.

The main goal of DMW is to encourage students to critically reflect on design as a non-human-centered practice. It challenges the designers' anthropocentric perspective by considering the agency of other non-human lifeforms — with a focus on plants — in a world that is constantly asking for a paradigm shift. By developing scenarios that foster new interaction strategies between humans and non-humans, the course seeks to promote a Multispecies Design perspective, trying to offer a less-anthropocentric approach to design. In this framework, during the weeks, students were asked to see plants not as resources but as agents and stakeholders with active social and political roles that influence and shape their environment. Besides developing a process in line

with a multispecies worldview, DMW also offers insights for rethinking the designer's role in the context of sustainability and multispecies coexistence, with particular focus on:

- **Expanding our perception of the surroundings, acknowledging the impact and importance of what we do**. Students are encouraged to expand their awareness of their environment, reflecting on how design decisions impact ecosystems. At the same time, the course emphasizes the fact that humans too are constantly "designed" by others (Escobar, 2018), revealing the deep interconnections between humans, plants and other entities.
- **Recognizing the power dynamics existing within a human-centered type of design that marginalizes the voices of non-human entities**. The course calls for a more inclusive approach, paying attention to listening to voices that are too often silenced due to social, political, and economic factors. By engaging with plants, students recognize those power structures, trying to reshape design processes that can foster equality and mutual respect.
- **Anticipating futures through design**. In a rapidly changing world, designers are often called upon to anticipate and envision the future, working through unpredictable scenarios with current resources, tools, and mindsets.

3. Methodology

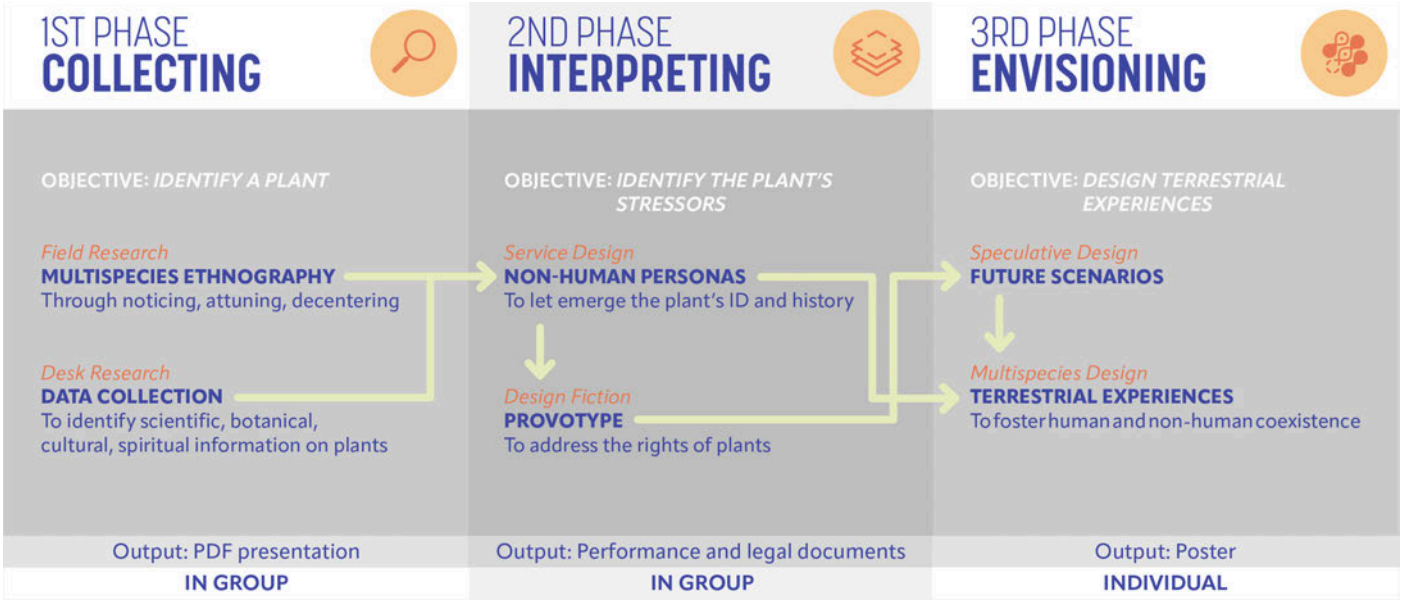

Figure 1. Diagram of the three interconnected phases of the DMW course. (Diagram by the authors)

The topics addressed by Multispecies Design lie at the intersection of various disciplines: Natural Sciences (Ecology, Ethnobotany, Plant Neurobiology), Social Sciences (Sociology, Political Science), Humanities (Philosophy), and Applied Sciences (Design, Urban Planning). With the aim of exploring the intersection of these disciplines in a more integrated manner — while striving to maintain the complexity inherent to the subject – the DMW course is structured in three interconnected phases (Figure 1). Each phase is specifically designed to guide students throughout the process, while experimenting with research and specific design methods. While lectures supporting both theoretical and practical knowledge on the subject were given throughout the semester, the three phases were conceived as a way to collect data, transform data into insights and design possible

multispecies interventions (named in the course as *experiences*). In order to work cohesively, the first two phases were managed as group works, as the third one as individual, in which each student could experiment with projects based on their own curriculum. Each of the three phases was structured to balance theoretical grounding and design practice through lectures, feedback sessions given by the teaching staff, and final presentations followed by collective feedbacks.

Collecting (group phase)
The initial two-week phase introduced students to a multispecies ethnographic approach, encouraging them to expand their perception of their surroundings. This involves recognizing the impact and the importance of human actions on other lifeforms and, at the same time, understanding that our context is constantly lived and impacted by non-human entities. Then, each group of 2 up to 4 students was called to explore the Nolo neighborhood to identify a plant living in the area that, from their perspective, expresses a specific discomfort (*stressors*) regarding the conditions of its surrounding environment. To focus on plants in challenging urban conditions, conventional green areas (such as gardens, small or big parks) were considered as off-limits spaces, encouraging students to choose plants that live in poor conditions due to human presence. This process was enhanced with methods such as:

- **Noticing**: observing and bringing to light the diverse entities that inhabit and shape urban spaces through fieldwork and urban walks.
- **Attuning**: harmonizing with the context and developing the capacity to listen to the needs of non-human entities.
- **Decentering**: adopting the perspective of other species (thus shifting away from an anthropocentric viewpoint) through the embodiment of these entities in performative activities.

The 11 groups identified 11 specific plants in the neighborhood and started to engage with them by observing them, analyzing the surrounding context, and trying to adopt their point of view to understand their behaviors and strategies. Following the field research, each group deepened their knowledge of the chosen plant by carrying out desk research, in order to collect data not only about botanical aspects (how the plants grow, behave, interact, etc.) but also on cultural knowledge (symbolic aspects, historical roles, artistic interpretations or related popular/spiritual beliefs). In this phase, notions of "decolonizing" practices (Escobar, 2018; Haraway, 2016; Ingold, 2015; Schultz et al., 2018) were introduced to support students in critically examining the emotional and conceptual frameworks that shape our relationships with the world.

Interpreting (group phase)
After completing the first phase of data collection, each group was tasked with synthesizing all the gathered knowledge into a plant's ID, which served to capture both scientific and cultural insights about the selected plants. This ID was later expanded and reworked into a variation of a non-human persona, specifically targeting the chosen plant. Groups were asked to translate scientific data that they collected in the previous phase into insights that outline the plant's identity. This step unfolded over three weeks and encouraged students to move beyond traditional stakeholders, fostering a deeper understanding of the plant’s role within its environment and its interactions with human and non-human agents. With the aim of helping students engage with the collected data, this second phase was strongly shaped by Speculative Design and Design Fiction methodologies. Students were provided with a future artefact — or "provotype" (Boer, 2011;

Mogensen, 1992) — a legal form coming from the year 2048, supposedly used by a fictional legal aid collective called "Arboreal Assistance". The given backstory proposed the existence of an interaction system between humans and plants — a “proxy” — capable of tracking the needs of the plants. Students were then asked to develop specific legal strategies to defend the plant, using storytelling tools to assume the role of the collective's legal team. Using this artefact — and performing the second delivery pretending to be lawyers — they designed a profile of the plant, providing fundamental information and speculating on possible legal interventions to safeguard their "plant client". This work resulted in the identification of plants' personalities, behaviors, characteristics, and strategies, considering their living conditions, their stressors, and their role in the urban environment (Figure 2).

Figure 2. Students presenting the outputs of the second phase while pretending to be lawyers discussing a cold case. The documents – provided by the teaching staff – were intended to be filled with information gathered about the specific plant chosen, detailing its needs and behaviors. During this phase, students used the *provotype* of the Plant Bill of Rights to devise a strategy, ultimately addressing the stressors perceived by the plant. (Picture by the authors)

Envisioning (individual phase)

The last phase — extended over four weeks — was meant to encourage reflection on the evolving role of designers, positioning them as facilitators, activists and “provocateurs” (Mogensen, 1992) that are often called upon to anticipate and envision the future. Playing the role of the *multispecies designer*, students were individually asked to design experiences that foster a win-win interaction between non-human and human stakeholders. With the intention of applying design as a process not solely focused on creating a "solution," students were challenged to design a *terrestrial experience* — a relationship carefully built and nurtured between a human and a plant. This relationship could be expressed in any form (spaces, products, services such as rituals, communication strategies, and wearable technology), depending on each student’s skills and curriculum. Additionally, students had the option to introduce another non-human agents — whether organic or synthetic — to enhance or mediate this interaction.

4. Results and discussion

4.1. Project outcomes and reflections

At the end of the third phase, students were asked to create a poster to describe their designed *experience* (Figure 3). This final output was envisioned as part of an imaginary future exhibition showcasing traces of *terrestrial experiences*. This exhibition featured 35 different projects of human-plant coexistence, each highlighting specific agents — both human and non-human — as key protagonists. The posters included the following information:

- A) The project concept expressed through: title, claim, short text, and key image.
- B) Information about the stakeholders (human and non-human) and any other non-humans involved in the relationship.
- C) An image of the proxy/interaction system specifically designed.
- D) A storyboard illustrating the experience between the agents, supported by the use of the proxy/interaction system.

Given the limitation on the amount of information to be presented, the teaching staff provided students with a standard format to follow.

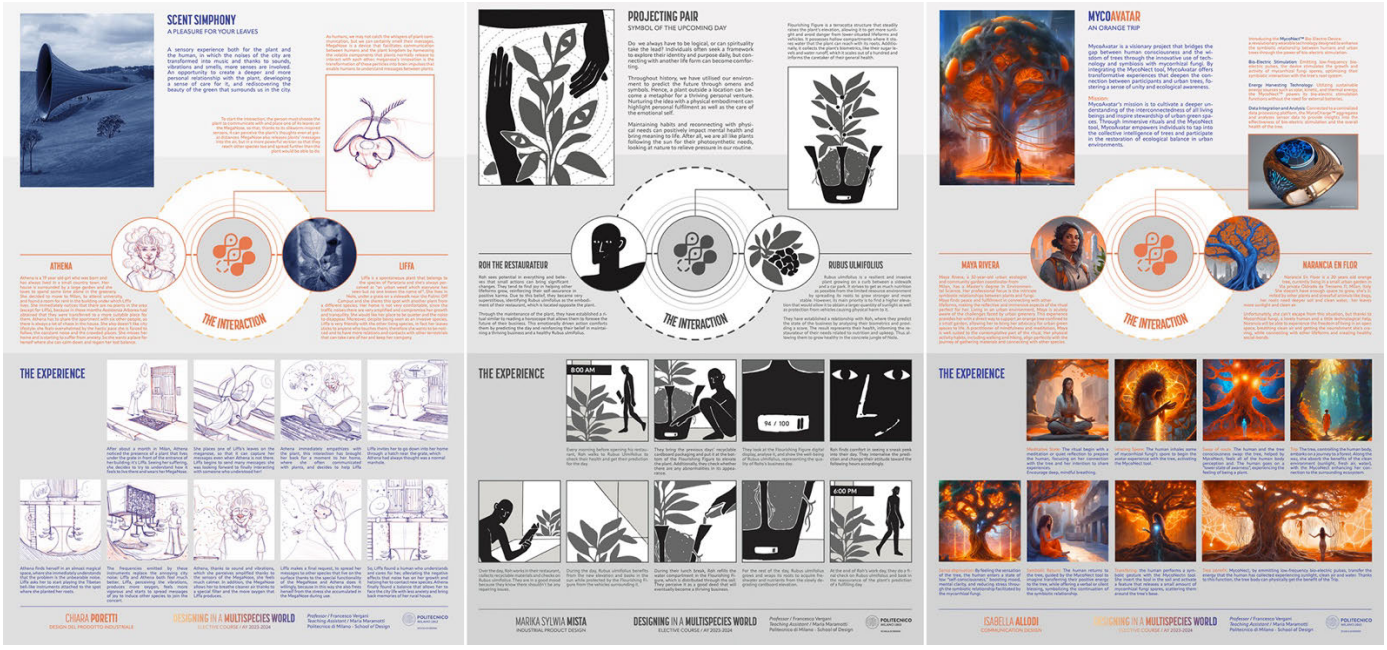

Figure 3. Three posters presenting projects by students. The first project (n° 26), *Scent Symphony* by Chiara Poretti, explores the relationship between a girl and a Parietaria plant growing under a grate on the sidewalk. Using *MegaNose*, a device that facilitates communication between humans and the plant kingdom by harnessing the volatile compounds plants naturally release to interact with one another, Chiara's idea involves transforming these particles into brain impulses, allowing humans to understand the messages exchanged between plants. The second project (n° 14), *Projecting Pair* by Marika Sylwia Mista, uses *Flourishing Figure*, a terracotta structure that gradually increases the height of a spontaneous plant growing on the street pavement, enabling it to receive more sunlight, water, and avoid hazards posed by lifeforms and vehicles situated in the surroundings. The third project (n° 8), *MycoAvatar* by Isabella Allodi, presents *MycoNect™*, a ritual – powered by a wearable technology – designed to enhance the symbiotic relationship between humans and trees through bioelectric stimulation. By emitting low-frequency bioelectric impulses, the device stimulates the growth and activity of mycorrhizal fungal spores, optimizing their symbiotic interaction with the tree's root system. (Pictures by the students)

The projects presented a variety of perspectives, showcasing relationships that were sometimes enhanced by new and speculative technologies and other times nurtured

through physical exchanges (Figure 4).

N°	Group Plant	Individual Project Title	Design				Experience Typology
			Prod.	Comm.	Spat.	Fash.	
1	*Moss*	Mossbyte	■	■	■		Spiritua conntection, Data storage
2		Fragmented Health	■		■		Information exchange, Physical care
3		Water Moss Totems	■				Physical care, Mutual exchange
4		Harmony of life	■		■		Information exchanges
5	*Nerium Oleander*	SYN-HELU – DEEP CONNECTION: TERRESTRIAL SOULS	■	■			Connection, Physical care
6		Light back up	■				Ritual, Mutual exchange
7		Rehab garden	■		■		Physical care
8	*Orange Tree*	MycoAvatar	■		■		Ritual, Physical connection
9		Good luck tree	■		■		Ritual
10		Life Belt	■			■	Mutual exchange
11		Rooted in presence			■		Meditation, Spiritual relation
12	*Rubus Ulmifolius*	Grumpy Pal	■				Digital app, Game interaction
13		Garden Glide	■		■		Digital interaction, Virtual space
14		Projecting Pair	■				Biometric exchange of data, Care
15		The Theremin Tree	■				Emotional connection
16	*Alfredo Laurustinus*	Reconnector	■				Game interaction, AI assistant
17		Plant a Pet	■				Care, Game interaction
18		Harmony Harvest: Hydrolink	■				Mutual exchange
19	*Nerium Oleander*	Common Ground	■		■		Emotional connection
20		Air Sanctuary	■		■		Physical care, Urban regeneration
21	*Ivy*	Vesty – The Symbiotic Vest	■			■	Physical connection, Symbiosis
22		Complete Hederacosid Count	■				Physical care
23		Oasis	■		■		Physical care, Mutual exchange
24	*Parietaria Judaica*	SNIFFING TALKS	■	■	■		Physical care, Mutual exchange
25		EUNOIA – Exhaling Memories	■		■		Mental care, Mutual exchange
26		Scent Simphony	■		■		Mental care, Spiritual connection
27	*Eriobotrya japonica*	Garden in the Sky			■		Mental care, Mutual exchange
28		Vital Symphony			■		Physical care, Community engagement
29		Empirical Harmonies	■		■		Physical care
30	*Wisteria*	The Path to the Wisteria's Nest			■		Game interaction, Mutual growth
31		INTERT(V)INED	■		■		Physical and mental care
32		WisyOn: I See You I Got You	■				Care, protection
33	*Dandelion*	Safety Above All	■				Physical care, Collaboration
34		PlantPal	■				Physical care, Data exchange
35		Bubble Friend	■				Facility

Figure 4. Diagram illustrating the information about the 35 student projects. From left to right, the columns indicate: 1. Project number, 2. The plant selected by the group during the first two phases of the course (and used as the non-human agent in the individual project), 3. The names of the individual projects, 4. Project type (Product, Communication, Spatial, or Fashion), and 5. The type of experience designed. (Diagram by the authors)

No specific limitations were imposed, apart from the request to engage creatively and design scenarios that transcended current technological knowledge. This proved particularly challenging for students, as many tended to present ideas firmly rooted in existing realities, struggling to demonstrate strong speculative abilities regarding the future of human beings and their practices. Although the field of More-than-human Design is now deeply intertwined with synthetic non-human agents, the course sought to focus more on the biological dimension of the human–plant relationship, deliberately setting aside digital components. During feedback sessions on *terrestrial experiences*, students were encouraged to rethink their approach and design *experiences* that could cultivate a physical, close-proximity relationship between human and non-humans, emphasizing the value of tangible engagement in the relational design process. However, many projects focused on interactions involving current digital devices (x30), such as apps or AI-driven technologies, revealing students' difficulty in moving beyond existing technological paradigms. Throughout project reviews, we encouraged them to explore physical low-tech alternatives (x5) and speculative futures, prompting a critical reflection on the limits of prevailing digital trends. Nonetheless, many final projects still included a basic digital component – including AI – despite the fact that neither the brief nor the theoretical inputs explicitly referenced it. This highlights a deep-rooted bias towards digitally-mediated futures and underscores the pervasive influence of the digital paradigm, even within More-than-human design frameworks.

Similarly, it proved particularly challenging to encourage students to move beyond a

strictly anthropocentric perspective, which viewed multispecies experience and relationships as merely instrumental or transactional (Figure 5). While the idea of a multispecies experiential relationship is especially complex from a non-human standpoint, it remains more readily accessible from a human one. For this reason, the outcomes revealed two main types of relationships:

- **Experiential relationship**: conceived as a mutually regenerative exchange, where – from the human side (which is more easily examined) – the benefit is less utilitarian and more emotional or affective.
- **Transactional relationship**: defined as a mutual exchange more akin to a trade of resources, aimed at achieving specific goals.

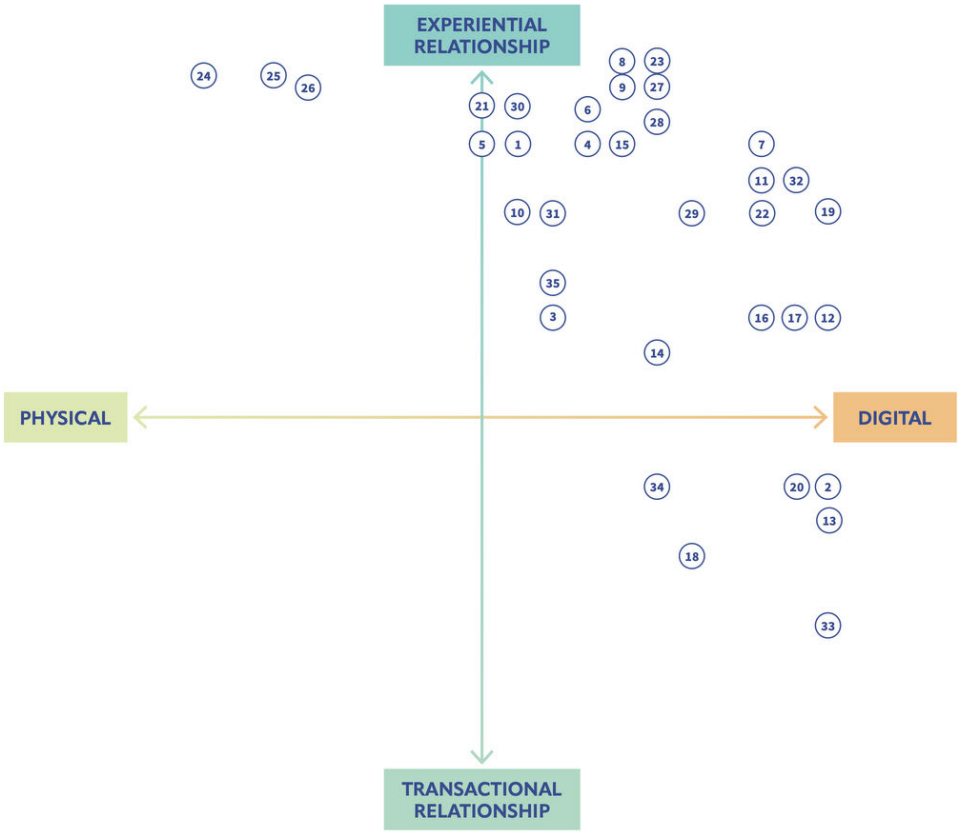

Figure 5. Positioning map of the 35 student projects. The horizontal axis represents the proxy/interaction system: on the left are projects in which the human-plant relationship is enhanced through physical means, while on the right are those mediated by digital technologies. The vertical axis shows the type of relationship: at the bottom are projects characterized as transactional, and at the top those that are framed as experiential. (Diagram by the authors)

The assessments of the three phases were based on the following criteria: A) the ability to grasp multispecies and more-than-human perspectives; B) the richness and coherence of the submitted materials; and C) presentation skills. For the final phase – the only individual and fully design-based task – criterion A was further devided into: A.1) the ability to move beyond an anthropocentric perspective; A.2) the capacity to create a "win-win" situation of mutual benefit for both human and plant; and A.3) the creativity and originality of the designed *experience*.

4.2. Challenges and key points

Analyzing the course results, it became evident that shifting to a non-anthropocentric perspective was neither simple nor immediate for students. This is reflected in the final *terrestrial experience*, where in some cases the interaction between humans and plants is not balanced, favoring the human entity at the expense of the non-human one.
To support students throughout the process, each of the three phases included feedback sessions — group sessions for the first two phases and one-to-one meetings for the final phase. In particular, the final phase focused on encouraging students to create projects that considered mutual benefit and avoided anthropocentric assumptions about the plant. Students were continuously prompted to revisit the data collected in earlier phases and to reinforce the idea that, just like humans — albeit in different ways — plants have specific needs and behaviors to consider. Additionally, it was emphasized that even if future communication with agents like plants becomes possible, the nature and quality of that relationship is unlikely to be mediated by a codified language.

Beyond the challenges students faced in shifting to a multispecies perspective, the course process highlighted several key points:

- **Non-human personas**: By recognizing plants as stakeholders to engage with and advocate for, the creative development of personas — even if unconventional — could help in better understanding them as active agents with social and political implications. However, non-human personas are often seen as an overly anthropocentric tool, making it challenging, if not impossible, to genuinely reflect a non-human perspective. For this reason, the decision to use the legal form of the "provotype" was adopted to provide greater meaning to the act of decentering and adopting a non-human point of view. This effort leads the students to recognize that, sometimes, the designer – even if not an expert on biology - needs to explore the not-known realm of the non-humans and be able to listen to voices that are silenced due to cultural, political, social and economic factors.

- **Human personas**: If students struggled to grasp the role of the non-human persona, they faced a similar challenge when creating the human persona. They were asked to identify a key persona rather than imagining random groups of people, with the aim of targeting the project towards a unique relationship. This request was specifically made to help students understand how the will to create universally applicable and scalable solutions is frequently problematic. Every relationship is inherently unique, shaped by a complex, situated system of human and non-human agents, influenced by social, cultural, and political elements that are difficult to replicate.

- **Multispecies justice:** The second phase of the course was aimed at reflecting on power dynamics and the not-recognized role of plants in human society by exploring the concept of “multispecies justice” (Celermajer et al., 2021; Fitz-Henry, 2022). By using Speculative Design and Design Fiction tools, students were asked to address the marginalization of non-human voices in societal decision-making as well as the critical concept of multispecies participation. Through this process, students were introduced to political and biopolitical perspectives, challenging them to integrate the multispecies dimension into new emerging paradigms of (cosmo)politics (Stengers, 1997) and ethics.

- **Time:** By introducing the idea of the future showcase for the 35 projects allowed students to reflect on the concept of temporality. Designing with non-humans raises compelling

questions about the differing timescales of growth and evolution between plants and humans (Fry, 2009). This idea was particularly emphasized throughout the course to help students recognize the need to expand their temporal horizons when approaching design itself. Temporality is an inherent challenge in Multispecies Design, as it represents one of the most significant differences in how various agents behave. Plants have vastly different growth cycles, and the idea of designing *experiences* based on simultaneous interactions — such as those often found in the animal kingdom — initially posed a considerable challenge for students. Beyond the design *experiences*, the element of time also played a crucial role in the initial phase of data collection. The use of multispecies ethnography required students to immerse themselves more deeply in the context, further complicated by the inability to rely on conventional human systems of communication and interaction. Students were tasked with closely observing plants, attempting to understand why they behaved in certain ways. Focusing on the plant's external qualities — such as the condition of its trunk, roots, canopy, and interactions with the surrounding environment — led to extensive field research. This process encouraged students to perceive the urban environment differently, shifting their attention towards an often-overlooked biological world that typically escapes the human gaze.

Figure 6. Students hanging posters with projects descriptions developed for the final exam. (Picture by the authors)

5. Conclusion and final considerations

The DMW course represents a significant step toward integrating non-human perspective into design education and practice, addressing urgent environmental issues and social challenges across the various design disciplines.

This paper outlines the first edition of the newly introduced course, reflecting on its strengths and areas for improvement. A second iteration is currently underway, offering an opportunity to further refine both the teaching practices and evaluation methods. By encouraging students to recognize non-humans as active and political agents within our society, the course fosters the practical application of critical theories while promoting a paradigm shift in design towards a multispecies coexistence perspective. This not only expanded their perception of the environments but also fostered a deeper awareness of the entanglements between human and non-human existence.

The thematic focus of the course challenged students to confront knowledge gaps, barriers and limitations in field research, allowing them to experiment with different approaches and methodologies. Through the hybridization between classroom and field work, the course promotes open and dialogic teaching that encourages critical reflection and speculative exploration. On-field learning allows students to immerse themselves in the real-world context, discovering new ways of conducting research and acquiring knowledge beyond the traditional academic setting. By immersing themselves in urban environment students were encouraged to attune to non-human presences that often remain silenced. At the same time, speculative design played a crucial role in engaging students in the design process, emphasizing the importance of envisioning solutions for unpredictable futures and facilitating the difficult shift in perspective.

Despite the difficulties encountered in embracing a multispecies point of view and moving beyond a human-centered perspective, students demonstrated a high level of engagement throughout the process. The positive feedback from students at the end of the course and project outcomes indicate that the course — besides the various issues addressed in the paper — successfully achieved its objectives, stimulating critical thinking and design creativity. Discussions and reflections that emerged during the semester reflected a growing openness to actively question plants' political representation and role in the urban environment. In the currently ongoing second edition of the course, we strengthened certain aspects to make the shift in perspective more effective. First and foremost, methods such as noticing, attuning, and decentering played a more prominent role compared to the original version described here. Secondly, a greater number of case studies — with extensive explanations of best and worst practices from a multispecies perspective — were presented to students in the early stages of the course.

The DWM course reinforced the awareness that design can no longer ignore the existence of other life forms in the design process. Multispecies practices must be recognized as a fundamental feature in designing inclusive and sustainable future scenarios, capable of addressing the urgent global challenges. By challenging students to move beyond human-centered paradigms, the course contributes to shape a new generation of designers that are aware of their own anthropocentric biases and equipped with the tools and sensitivities to contribute to new perspectives on cohabitation and multispecies coexistence.

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Housing for Good: Catalysing Ecological Citizen(s) a Method of Designing 'Sustainable Conditions'.

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ABSTRACT | The UK is tackling crises in climate change, living costs, social inequalities, rocketing housing prices and a disengagement from our natural world. These factors impact human health, wellbeing, societal cohesion, and also accessible and equitable opportunities. Sustainable design interventions are: interconnected, complex, place-based and culturally contextual. Sustainable proposals should be embedded into our lives, equitably and accessible to all citizens. In contemporary times, it is also sadly notable that humans are not formally given the knowledge, or resources, to look after ecosystems *Homo sapiens* relies on for life. This often leaves sustainable practices polarised, seemingly draconian or seen as a luxury.

Society needs new ways to navigate socially equitable, accessible and designed models that are financially stable, catalysing sustainable action(s). Relationships with nature must be built into our communities, lives and homes. Authors believe social constructs live alongside pro-active rejuvenation of the natural world, with overlapping co-benefits to humans and more-than-humans. Buckton *et al*, *The Regenerative Lens* states societies must "transform their dynamics to support the flourishing of life. [As] there is increasing interest in regeneration but also limited cohered understanding of what constitutes regenerative systems at social-ecological scales" (2023).

Authors introduce Ecological Citizenship (EC): activities establishing and catalysing sustainable practice(s) addressing ecological inequalities (Phillips *et al.,* 2024). The Ecological Citizen(s) Network is intent on catalysing transitions with communities by

providing autonomy, accessibility to design, initiating sustainable conditions and open pro-social possibilities. The Housing for Good (HFG) concept perceives preferable futures where thousands of people can catalyse communities inclusively empowered by; affordable housing, time, accessible space and security. HFG is an ambitious initiative providing highly affordable housing to citizens in exchange for their contributions in making communities healthier, greener, stronger and more joyful.

The design-led HFG connects design practice(s), social constructs and philanthropic finances, requiring lived experience and expertise to navigate. HFG explores social inequalities, while exploring contemporary and future designers' roles in city transformation, through tangible examples. The article's main argument unpacks an accessible housing opportunity, benefiting nature, citizens and communities, engaging 30+ citizens in two UK locations, with transferable lessons and insights. The work trialled more inclusive and accessible strategic design methods.

Our intention supports climate-positive post-participatory design, with citizens, providing a repeatable internationally applicable framework, for place-based application contexts. The Ecological Citizen(s) Network is UKRI funded and mandated to prioritise the UK. Authors are against imposing colonialist activities; hence the work's focus is UK-centric in practice, whilst unpacking a scalable international concept. Other parties can build on HFG, as place-based contextual nuances and cultural understanding is paramount. Resilience signifies moving beyond governmental systems and establishing citizen legacies. Authors are intent on designing beyond generations and believe co-designing to benefit people and nature concerns nurturing community autonomy with the means to become Ecological Citizen(s). The UK has recently emerged from 14 years of self-interested political rule, stripping public services (Knight, 2024 & Elledge, 2024) … Citizens deserve more resilient, nature-aligned approaches.

Research Objective | Unpacking a housing opportunity, benefiting nature, citizens and communities, engaging over 30 citizens in two UK locations. Trialling more inclusive and accessible strategic design methods, unpacking wider pitfalls, benefits and opportunities of The Housing for Good Concept.

KEYWORDS | Ecological Citizenship, Regenerative Design, Inclusive Design, Nature-inspired Design, Resilient Design.

1. Introduction

In this article we are designing, operating within a contemporary time and unpacking new design-led opportunities, through collaborative post-participatory design. The links between: climate change, biodiversity loss, and social inequalities are complex and hard to unpack. They are all bound by: where we live, the communities we are part of, and what those infrastructures can provide. Where we live is not always accessible and (as we see within the UK), local communities get priced out (Smith, 2023), leaving little time for voluntary actions or socially-led developments (Kear-Davies, 2024). The power of accessible living, community and nature require realigning so that the developments of co-designing can be embedded into contextual situations. *The Ecological Citizen(s) Network* has a UK perspective, bound by our funding remit and working reach. This work is UK-centric as we explore: legislation, probate, social design and charity statuses. The challenge however is international, with evidence in: Australia (Dumas, 2024), Europe (Carbonell, 2024 & EU Commission, 2024), USA (Callaci, 2024) and more. We do not want to colonialise (Kobayashi, 2019) but seek to open the discourse for a working typology, bound by our lived experience and context, hence our UK-centred frame.

The article unpacks the intent of equitable means for cities and citizens to have autonomy, for nature's benefit. The insights are beneficial to; social design constructs, preferable futures and enabling the development of citizen-led infrastructures. The role of *The Ecological Citizen(s) Network* was design-led, convening and uniting the initiative

strategically, with originator Daniel Raven-Ellison: Slow-Ways (slowways.org) & National Park Cities (nationalparkcity.org) founder. Design as a practice is a "powerful agent for change, and a tool for progress in all fields - social, political, and environmental", and design "is fundamental to shaping our climate futures" (Johnson, 2024, p.106 & Johnson, 2024, p.104).

Authors aligned themselves with "designers tak[ing] on new roles and mediators and conveners between research, politics and society" (Groß, & Mandir, 2024, p.18). The intention was to inform the *Sustainable Digital Society*, defined by the UKRI as the "social and economic sustainability are interconnected with environmental sustainability" (UKRI, 2020). Technologies can connect people, creating a more sustainable resilient society, providing benefits for people, nature and more-than-humans. Authors introduce topics of: Ecological Citizenship, One Health, Contemporary Design Examples, and UK Housing. We foresee the links between climate change, biodiversity loss, and social inequalities building on Wilkinson's view that "sustainability is inseparable from the campaign for greater equality" (2020). The work Informs: current and future roles of designers in city transformation around places, we call home.

1.1 Ecological Citizenship

Ecological Citizenship (EC) is "an activity or a skill that anyone can do, which helps establish sustainable practice(s) and address ecological inequalities. This includes community-led sustainability approaches leading to scalable, transferable 'design values' for wider application(s)" (Phillips, *et al.*, 2022, p.2). Our EC position is intent on enabling: sustainable purpose, autonomy and equality in citizens as cross-disciplinary creatives through Public-Interest Technologies (PITs). PITs are "technologies used to serve the public good" (Ford Foundation, 2024). PITs should be appropriate to their application and context with different lenses, not solely conventional or traditional views of 'high technologies' (Hooton, 2018). For example, Indigenous Technology demonstrated in naturally drying Cod (for preservation) in the *Lofoten Islands, Norway* (Hung, 2023). The air temperature is cool, and the fish does not spoil, requiring; local knowledge, skill, and environmental expertise. Contextual Technology is site-specific and place-based, an example is an Ice Stupa: an "artificial glacier, designed to refreeze glacier meltwater and facilitate water storage, a techno-scientific intervention" (Kleinman Center for Energy Policy, 2023). Participatory Technology e.g. Park(ing) Day a global, public, participatory project where people internationally 'temporarily repurpose' curbside parking spaces, converting them into public parks and social spaces advocating for safer, greener, and more equitable streets for citizens (Park(ing) Day, 2024). The work builds on *Mead's*, "Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that ever has" (Institute for Intercultural Studies, 2001). We frame EC touchpoints as 'design proposals' that are appropriate to their contexts, accessible and equitable to their communities.

1.2 One Health |

Our "human-nature relationship is an important one, to understand, enhance, and protect" (Brymer, *et al.*, 2019). The need to transform the human-nature relationship has never been more important. People "who feel closer to nature are happier and more satisfied with life and are more likely to take actions that help wildlife and the environment" (Miles, 2022). The One Health approach deals with "the health-related interactions that occur between these systems at differing levels of complexity" (Rabinowitz, *et al.,* 2018). Having the One Health approach in place "makes it easier for people to better understand the co-benefits, risks, trade-offs and opportunities to advance equitable and holistic solutions" (WHO, 2022). Parallel organisations refer to the human-nature relationship as the *Natural Health Service* (NHS) "part of a holistic approach to health and social care reducing pressure on NHS and local authority resources in the medium term" (Oliver, 2022). Recent reporting on the NHS states "a social return of £8.50 for every £1 invested in Wildlife Trust volunteering

programmes strengthens the argument for a community-based approach to health" (The Wildlife Trusts, 2023). The UK Government's inaction in recent years requires contemplation. The Government has only protected 5% of England, against its own target of 30% by 2030 (RSPB England, 2021), ignoring the advice of Natural England to meet COP commitments (Greenfield, *et al.,* 2023). The UK failed to reach 17 out of 20 UN biodiversity targets agreed on 10 years ago, in six areas the UK has gone backwards (RSPB, 2024). In summary, interacting and cultivating engagements with the natural world result in: positive personal health, community cohesion and biodiversity benefitting all – whilst current UK government initiatives are not adequate.

1.3 Designed Examples

There is an inherent link between: cultures, people, place(s) with an agenda toward pro-social behaviour (Wittek, *et al.,* 2015). Recently designers and sustainability leaders advocated for designing the 'conditions to enable change', in the provision of equitable access (Manzini, 2020). A historical example of this is positively linking people to communities and places, for example: tenant farming (TFA, n.d.), lock keepers' cottages, on-site caretakers (TrustedHousesitters.com, 2024), live-in childcare (Hampstead Nannies, 2024), armed forces family housing (Army Families Federation, 2024), amongst others. However, these examples are all solely transactional, not social innovations or featuring a component that regenerates the area surrounding its deployment. Social Innovations consist of new products and "services, processes, markets, collaborative platforms, organisation forms (social movements or institutions), and business models" (Caulier-Grice, *et al.,* 2012). The following examples are more complex, intervening at specific touchpoints in social-design spaces. They are contemporary (at time of writing) and empower citizens in new typologies toward a sustainable digital society:

1. *Fat Macy's* (2024), a social enterprise supporting people to accrue a housing deposit, navigating the 'benefits trap' where people are incentivised not to work. After 200 hours, *Fat Macy's* trainees can access a 'Housing Deposit Grant' as a deposit on rented accommodation – with ongoing transition support into independent living. *Fat Macy's* provides accessible, practical means enabling people to progress through dysfunctional legislation.
2. *Casserole Club* (2014), helps people share home-cooked extra food portions with neighbours who are unable to cook for themselves. Club members serve meals to neighbours strengthening neighbourhood relationships. On average (at time of writing) it costs councils £4.90 to provide one meal, if 100 diners get on average two meals a week from a neighbour, "Casserole Club would save councils £50,960 a year" (Casserole Club, 2014). A design-led intervention supporting accessible support and overtime results in pro-social behaviour with members undertaking different tasks for Club members.
3. *Team Dominica* (2024), a cafe enabling neurodiverse individuals to gain work, through innovative employment programmes. It supports young candidates to emphasise their role, ready for paid work. *Team Dominica's* holistic approach is personalised to candidates, developing their independence, confidence, communication, and skills ready for employment. This accessible catalyst nurtures and develops people holistically.
4. *Nature Neighbourhoods* (RSPB, 2024b), follows in the footsteps of *The People's Plan for Nature* (Cdunn, 2023): a vision to protect and renew nature in the UK. All around the UK, amazing people have been flocking together to bring nature back to their communities through the Nature Neighbourhoods project.
5. *The Community Power Act* (Bell, *et al.,* 2020), created by *The Young Foundation*. Away from Westminster, thousands of community leaders have been working tirelessly to tackle these very challenges as they find them in their neighbourhoods: challenges like inequality, local decline, loneliness and mistrust. The Community Power Act, is a major

piece of legislation (in progress) which would fundamentally change where power lies in this country. It is made up of three parts: Establishing new community rights: 1) A Community Right to Buy 2) A Community Right to Shape Public Services, and 3) A Community Right to Control Investment.

6. *Play Streets* (2024) enable children to play freely, without organised activities. This means children: cycle, scoot, chalk, skip, kick a ball, etc. These neighbour-led short road closures, create safe spaces for children to play on their doorstep. With council permission and consensus from neighbours, residents legally close the road, using signs or other barriers. Volunteer stewards are guardians of the street restricting vehicles, keeping it safe. The model (developed by parents) has now scaled to street communities throughout the UK supported by councils and organisations.
7. *Oosterwold, Netherlands* (Knikker, 2024), *Oosterwold* is an (non-UK) experiment that takes 'citizens' seriously and leads to an abundance of innovation and sustainable lifestyle options, in which self-organisation prevails over market thinking. Industrial-scale farmland has been turned into a small-scale food-producing landscape. Oosterwold (about 1,000 residential units) is a sprawl of gardens, from greenhouses to pastures. It is bound together with a social contract "if you want to live in Oosterwold, you have to produce food on at least 50% of your property" and is operating successfully (Docter-Loeb, 2024).

These examples present alternative social and community design space(s) building-off: broken government infrastructures, local responses, and place-based employment – and enable communities to navigate some scenarios that impact them. They build on *Visions of Climate Futures*, providing metrics of "what brings you joy, what are you good at, what work needs doing?", however not all of them build accessible opportunities to enable those dreams (Johnson, 2024, p. 424). They build on existing failing governmental systems, but point toward 'better' where citizens have some autonomy informing their circumstances, they are also 'place-based' providing new opportunities.

1.4 UK Housing

The current status of UK housing is "failing", with demand outstripping supply and construction costs increasing. Factors, coupled with rising living costs, mean that homelessness is set to accelerate unless addressed. The amount of people "experiencing homelessness could double, reaching 620,000 by 2045", without action (National Housing Federation, 2024). This will be exacerbated as "social housing waiting lists will grow to 1.8 million households by 2045 – an increase of more than 50%" (National Housing Federation, 2024). *The Joseph Rowntree Foundation* reports on the rising cost of living (in parallel to the housing crisis) with families: reducing food portions, impacting their health (2024). In recent social housing studies "86% of tenants reported the cost-of-living crisis was affecting their ability to 'get-by', financially" (Thomas, 2024).

With phenomena such as 'boomerang children' moving back in with parents on the increase, housing is in freefall (Seiter, *et al.,* 2024). Finally, communities suffer the 'Airbnb effect' (Gant, 2016) similar to gentrification, slowly increasing an area's value to the detriment of indigenous residents, "many of whom are pushed out due to financial constraints" (Barker, 2021). This situation is only exacerbated by recent reports that housing developers are failing to deliver on their ecological "mitigations and enhancements" across England (Chapman *et al.,* 2024 p.29). The combination of: costs of living, rising house prices, gentrification, developers not delivering on ecological promises, and time-poor residents, is impacting 'accessible housing' and our ability to interact with the natural world.

1.5 The Housing for Good Proposition

Housing for Good (HFG) is an ambitious initiative aimed at providing highly affordable housing to residents in exchange for their contributions in making communities healthier,

greener, stronger and more joyful. The concept unpacks multiple elements. *1)* Recruit residents who contribute to the wellbeing of people, places and communities - through projects that boost health, nature, joy, art, play, fairness, and more - offering the opportunity to rent a home for as little as £100 a week. *2)* The properties and community organisers will be managed by non-profit organisations, with clusters of housing enabling greater impact, professional networks, and economies of scale. *3)* The moonshot goal is to establish a House for Good (HFG) in every neighbourhood across the country, counteracting shortages of:

- Professional community organisers in communities, that result in less community activity/fewer pro-social benefits (Guerrilla Foundation, 2024).
- Financial models to give residents security to work and stay in neighbourhoods (Reporter, 2022).
- Charitable gifts provided to secure neighbourhood assets, that can be used to benefit communities in perpetuity (GOV.UK, 2024).
- Affordable Houses and intergenerational inequalities (Shelter England, 2024).

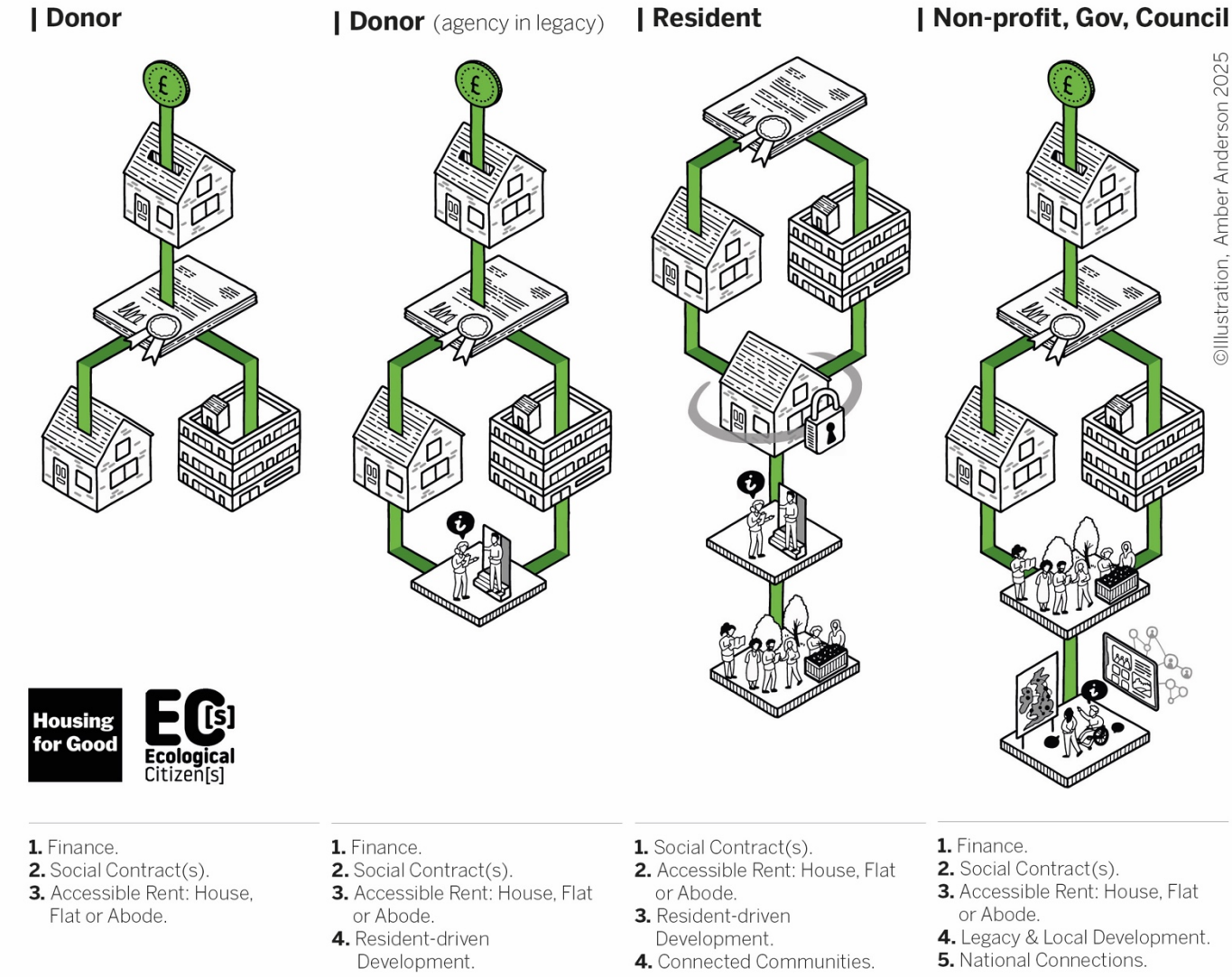

Figure 1; introducing the key partners within Housing for Good. **Donors** (with or without influence on potential legacies), **Residents** (people who would live there) and **Non-Profits / Governments and Councils**. The illustrations break down the overview with steps-in progress.

1.6 Key Partners within Housing for Good

Donors: Have the knowledge that they are creating a lasting and meaningful legacy.

Donors may also benefit from tax advantages. **Communities:** Benefit from having dedicated individuals focused on helping communities and places to flourish - facilitating events, organising activities, connecting people, sharing skills, supporting projects and more. **Residents:** Gain affordable housing and support, giving them the confidence, time, and space to invest deeply in their communities. They get access to a professional community and professional development. **Non-Profits:** Strengthen their impact and expand their reach within communities. They might make affordable housing available to employees and use properties as a form of income. **Governments and Councils:** Support community activities aligned with public agendas while increasing affordable housing and fostering citizen collaboration. Housing for Good will also become a charity in its own right that works to make the initiative a success - the nature of its objectives and services are yet to be determined.

The government could catalyse the HFG initiative with income from *Bona Vacantia* (ownerless) properties where profits go to the 'Crown' (GOV.UK, 2024b). In the 2022-2023 fiscal year, the Crown Nominee Account reported £76 million in revenue from unclaimed estates and assets. That income could be used to support the initiative and to match-fund gifts (GOV.UK, 2024b). This work navigates a reduction in either rental or short-term lease (akin to tenant farming) where residents become 'Ecological Citizen(s) in Residence' using respite from full rent to cultivate their expertise within the local community. This could include: regreening (WeForest, 2023), rewilding (Rewilding Britain, 2024), reducing CO_2 impacts (European Environment Agency, 2024), helping people to insulate houses (Woodward, 2021), sustainable pro-social behaviours (Frey, *et.al,* 2004), supporting ecological pedagogy (British Ecological Society, 2024), providing accessible health walks and many other place-based activities (National Lottery Community Fund, 2024). Many might see a correlation with a "citizens advice bureau" but this concerns 'citizen action' for local, societal and ecological benefit (Citizens Advice, 2024). The HFG's financing model leverages gifts in wills, equity release gifts from downsizing homeowners or legalese (bona vacantia) that is often 'soaked-up' by the Crown when people pass away (GOV.UK, 2024b).

1.7 Introduction Summary

The introduced design space is interconnected and requires navigating within existing UK systems. The HFG complexity unites; design, legislation, citizens, legalise, charities, 'one health', natural-world stewardship, urban contexts, cities and finance. This article focuses on unpacking the systems within design and the methodological approach, contextually grounding the audience with insights into the challenge. The unification of these approaches, explores new socially-led models of design. *The Ecological Citizen(s) Network* is funded by the UKRI and thus activities must benefit the UK. Authors do not believe in imposing colonialist activities; hence the work is UK-centric, and we call it out. If other parties can build on these concepts, that is fantastic, as place-based contextual nuances and cultural understanding is paramount. The authors' collaborative concept comes from the notion that: being secure in your housing is a core that enables you to innovate with your local community. Authors believe in co-designing benefits for people and nature, that people need time capacity, and for potential benefits to be equitable.

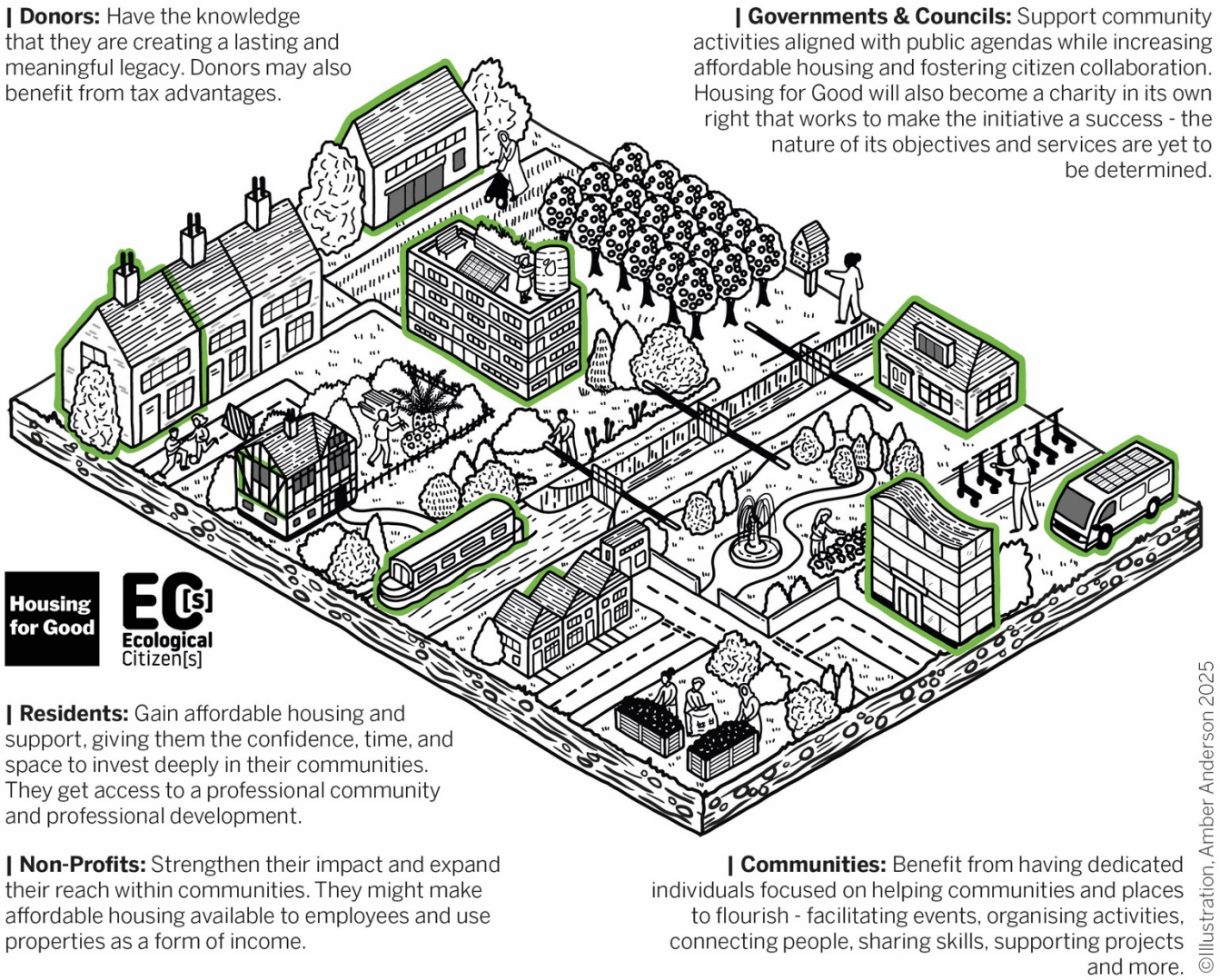

Figure 2; The vision of Housing for Good (within this remit) is to create 'Ecological Citizen(s) in Residence' cultivating their expertise within the community or communities, but it has broad reaching applications. EC in residence Includes (but not exclusive to): regreening, rewilding, reducing CO_2 impacts, helping people to insulate houses, sustainable pro-social behaviours, supporting ecological pedagogy.

2. Methodology

Within this design frame there is a unique combination of typologies and theories, including: participatory action research (Baum, 2006), participatory design (Muller, *et al.,* 1993), systems design (Mumford, 2000) and Engaging Design (Phillips, *et.al,* 2022). Firstly, the balance between expert/citizen(s) needs navigation, it is often polarised, rather than contextually nurtured but expertise can also unveil 'strategic intervention points' (Chen, *et al.,* 2022 & Lawrence, *et al.,* 2021). We rebalance our accounts of experts, as the epistemology of expertise requires "recentering onto one's current geo-cultural location" i.e. it should not be colonial by approach (Farina, *et al.,* 2024, p.254). We are not advocating for either/or, but more strategic inputs that simply benefit and empower 'people'. Technically we are all 'citizens' with areas of expertise and lived experiences, the difference is the power relationships, dynamics and accessibility. We believe that 'expertise' can build on knowledge and provide empowerment.

Participatory Action Research (PAR) a design approach, "involves collaboration between a community with lived experience of a social issue and professional researchers, often based in universities, who contribute relevant knowledge, skills, resources and networks" (Cornish, *et al.,* 2023, p.1). PAR can be a "problematic tool for facilitators and communities to apply due to power relations within the research process" (De Oliveira, 2023).

Participatory Research (PR) differs, and the main failing is the "trust is a core feature of PR (and all research involving relationships and/or partnerships" (Armstrong, *et al.,* 2022). Here we also scaffold off systems thinking "recognizing tipping points and transformative change rather than assuming linear changes" (Grewatsch, *et al.,* 2021). Our approach is closer to Engaging Design:

> (noun) "as another that borrows from design traditions and emergent design disciplines; to 'Engage Design' (verb) as a tool (for change), to design in ways that engage (adjective). Moreover, ED is a process that recognises its own capacity as a form of material, cultural language that has value in supporting interactions with critical issues of our time" (Phillips, *et.al*, 2021, p.26).

The methodological approach is more unique, designing for "collective autonomy", considering systems and how to unlock their potential to be Ecological Citizen(s) (Phillips, *et.al,* 2024b, p.6). Finally, we know imagination is needed to drive societal-scale decision-making, its governance and processes is a "wicked problem because of the complexity of the issues and the diversity of their conceptualizations; uncertainty about possible outcomes of decisions; and the difficulty of getting people together, at appropriate scales, to achieve a shared understanding" (Cork, *et al.,* 2023). Imagination "is central to empathy, to creating better lives, to envisioning and then enacting a positive future. Yet imagination is also demonstrably in decline at precisely the moment when we need it most" (Hopkins, 2019). The main difference between our approach is working strategically on all fronts, in parallel. On *The Ecological Citizen(s) Network* we work within the complexity of interdependencies and collective multi-domain knowledge, to seek collective autonomy. The role of *The Ecological Citizen(s) Network* was design-led convening and uniting the initiative strategically, i.e. 'creating the conditions' (Manzini, 2020) for critique and development. We borrowed our workshop structure and principles from co-design (Örnekoğlu-Selçuk, *et al.,* 2023), more importantly by inviting a participatory agreement (Groß, & Mandir, 2024, p.142) with a clear agenda and understanding of co-created knowledge.

1.1 Locations

Two workshops were organised: *1)* London and *2)* Exeter (2024), based on the required knowledge and audience(s).

Location 1) *Toynbee Hall* (TH) was created in 1884 with a radical vision as a place for future leaders to live and work as volunteers in London's East End, bringing them face-to-face with poverty, and giving them the "opportunity to develop practical solutions that they could take with them into national life" (Toynbee Hall, 2024). TH is a community organisation that pioneers ways to reduce structural disadvantage. Based in the East End of London, they work alongside people who live there, to tackle unfairness and make it a place where everyone has an equal chance to thrive, and they believe everyone has something valuable to offer in the fight for a fairer London. They constantly learn from their work in London we use to influence change across the UK. They also have an advice hub that proactively helps community members navigate: debt, benefits, housing, employment. Finally, TH houses *The Young Foundation*, the UK's home for community research and social innovation bringing communities, organisations and policymakers together to shape a fairer future (Toynbee Hall, 2024).

Location 2) *Positive Light Projects*, is a not-for-profit organisation in Exeter utilising visual arts to engage/inspire a diverse range of audiences and communities, focusing on socially engaged creative practices. They support local community groups and independent creative practitioners, especially those committed to socially engaged participatory practice (Positive Light Projects, 2024). The locations embodied deep connections with established communities, offering diverse perspectives and contexts.

1.2 Structure

The work's objective deployed co-designing benefits for people and nature: trialling more inclusive and accessible strategic design methods. The workshop structure built on: systems thinking (Cabrera, 2023), designing for wicked problems (Buchanan, 1992), service design (Stickdorn, *et al.,* 2018), imagination futures (Groß, & Mandir, 2024), and building 'What if' questions (Hopkins, 2019), to answer the objective. Authors broke the challenge into separate layers, making it easier to digest, explore and collaborate on. Invitees were strategically aligned based on their lived experience in: finance, end of life, probate, property, design, housing, land ownership, ecology, business, policy, communities, housing specialists and landlords. Citizens were pre-organised into groups, due to their expertise and how they could catalyse each other. We followed an Equity Diversity and Inclusion plan and ensured a gender balance, and sought to onboard people who would benefit from the network and could contribute through their lived experience(s).

The workshop format was initiated with an introduction to the HFG concept, a sharing session (designed to facilitate a culture of learning and collaboration) and an open discussion contextualising the work. Teams were then facilitated in dialogue around a collective 'design canvas' (Figure.1). The worksheet drew on existing research (Nagle, *et al.,* 2016), prototyping (Lauff, *et al.,* 2019) and applying principles (Hoda, 2024): identifying the domain/actors, phenomenon/topic to investigate, carefully assessing research ethics and considering the research values, the guiding research questions, the team's philosophy, deciding on the initial research protocols techniques, and tools, and desirable impacts.

Authors took the definition of a social contract to be a grant or guarantee of rights, franchises, or privileges. The social contract is an important set of rights that protect all parties, with clear expectations. We designed the format to capture what the Housing for Good social contract should contain and how this would work in unison with the 'perceived' tangible events enabling this design intervention to work. The Housing for Good research objective explores a housing opportunity, benefiting nature, citizens and communities. We engaged 30+ citizens in two UK locations, trialling more inclusive and accessible strategic design methods.

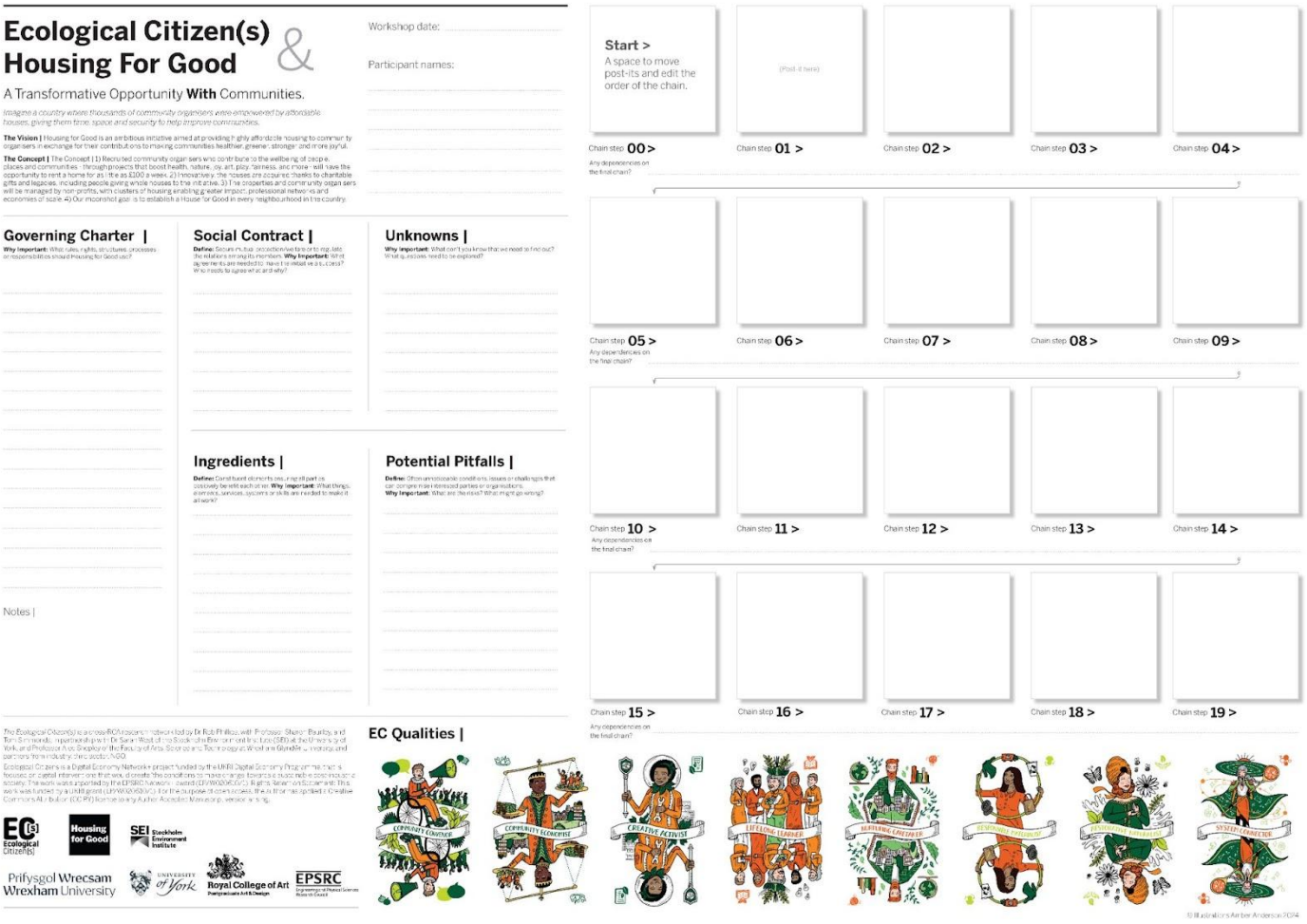

Figure 3; The worksheet was designed so citizens could create in combination. The cells enabled citizens to constantly edit the order of their decisions, by re-ordering post-it notes.

1.3 Elements

Each group was guided to solve their own challenge and advised that the other elements were resolved and working well. Assets were created aligning with business models guiding the citizens in the work. Each worksheet was specifically designed to be collaborative and iterative using post-its and working the layers together in individual groups focusing on perspectives of: *1)* Donors *2)* Residents *3)* Charities. Invitees were primed beforehand by email, and some introduced by video call. The workshop order followed: ethics processes, introduction to the design space, and an open discussion exploring the narrative of a design worksheet in small team(s). Authors perceived that we would learn from the negative aspects that our citizens would unearth, so were specific to mix Donors, Residents and Charities together.

1.4 Toynbee Hall, Workshop

Common themes raised included: placemaking and creating autonomy to local communities, charities or organisations with a governance structure that protects all parties. The invited citizens included: artists, charities, philanthropic donors, housing officers, strategic advisors and community groups.

Figure 4; Mapping work from the Toynbee Hall session.

1.5 Positive Light Projects (PLP), Workshop

PLP, Exeter is a not-for-profit organisation utilising the visual arts to engage and inspire a diverse range of audiences and communities, as well as developing emerging practitioners and aiding them to move their practise forward in exciting and innovative ways. They focus on community based, socially engaged creative practice. They enhance people's wellbeing and skills by offering engaging, collaborative, participatory, immersive and high-quality practical creative opportunities, enabling people to take part and have a go at exciting activities. We used the pop-shop space to host invited citizens: Artists, Planning Policy Advisors, Homes England (GOV.UK, 2024c), Devon Wildlife Trust, Dartmoor National Park, Labour MP (Exeter Labour Party, 2024) and City Councillors. They were grounded by the place. As with Toynbee Hall, we used the same process inviting them to catalyse their interest and introduce themselves, then the EC team guided them through the work (Figure 2). The salient points from gathered material have been thematically analysed through affinity mapping (Gupta, *et al.,* 2016).

3. Results & Discussion

The authors have combined the results and discussion sections as they are more integral and high level within this type of work. The authors foresee an overarching charity (or similar) that is established to ensure that e.g. a financial issue within a particular location or location doesn't jeopardise the system. It would encourage local and contextual scenarios of use, giving parties protection, but enabling appropriation by local elements aligning with the autonomy expected in Ecological Citizenship (Phillips, *et.al*, 2024b).

> Core strengths, "the proposition is truly accessible, as normally people simply value what they can get rather than being included, there is a lot of value in the choice that

anyone can make" **Participant 03**.

Governance, "it can have core values but then be appropriated by the local citizens" **Participant 08**. *Author Reflection*: if it does not have a detrimental affect on legalities then the social contract can be evolved based on place-based needs. Governance, is highlighted as future work.

Being the sole overseeing organisation, "there is a challenge of being the charitable supporter and evictor, if it all goes wrong which can really cause ethical turmoil to those involved" **Participant 13**. *Author Reflection*: even though there are vulnerabilities, this initiative can accessibly build on initiatives as long as the vulnerabilities are transparent.

"What happens in the dystopian future, housing is the foundation of people's lives" **Participant 26**. *Author Reflection:* the notion of future proofing was heavily discussed.

The resulting HFG insights have then been translated into: pitfalls, benefits and opportunities (pertinent to the research objective), as the granular challenges are too finite to describe.

2.1 Pitfalls |

Accountability: The power structure and governance need careful consideration, being contextually agreed as a social contract, that is accessible and clear to all parties. This opens the processes to transition Housing for Good to bounded activities, so parties are safeguarded. We suggest stages and approval processes akin to a school's board of governors. Processes should remove 'unsaid' liability with a clear remit from each party.

Motivations and Values: These will be different for all parties; their alignment is critical, as if people are not aligned in their values, then the Housing for Good concept would have fundamental challenges in its collective aim. The motivational factors for donors also need consideration, as finances are very different to donating property.

Safeguarding: The biggest question is; how do we protect all parties, and what happens during potential Housing for Good conflict(s)? This framework needs attention with open reflection on colonialism/higher powers, perhaps within the framework of Citizen(s) assemblies or similar. It also draws attention to the structures of how charities can be run, owned or operated. The Housing for Good initiative might have an application process or 'external peer review', as systems of trust need transparency enabling: responsibility and accountability.

Decision making: Who decides if the tenant has done 'enough good' or if their actions are appropriate for the 'good'. This in turn opens the need for provincial 'terms' bounded by those citizens… almost like a Hippocratic Oath. An example of this is *Detroit SOUP*, a micro granting dinner supporting creative projects, originated in the USA, (Build Institute, 2024). For a $10 donation, attendees receive dinner and a vote, hearing from four presentations. Presenters have four minutes to share concepts and answer audience questions. At the event, attendees eat, talk, enjoy art and vote on the project they think benefits the city the most. At the night's end, organisers count votes, and the winner gets all the money raised to execute the project.

Boundaries: There must be mutual trust from all parties involved, the donor, the resident, the organisation and any suggested governance process. This is not just to protect the organisation, but also residents. Employment laws provide clarity of expectations and deliveries, voluntary systems are more opaque. For example, if everyone in your community knows where you live (in your role promoting place-based good) and your role is for the local community, how do you defend your personal boundaries? Finally, there might be processes of; resident selection, onboarding and exiting that requires careful handling.

2.2 Benefits

Placemaking: There is substantial benefit to the concept of place-making (Wyckoff, 2014) as it builds on 'who' people are a good citizen to, i.e. the place? More than humans? etc. Separating the 'good' (i.e. people subsidised for cultivating good) and 'housing' (the residential construct) was raised; there is complexity, but the importance is the place-making. The concept was seen as the 'modern blacksmith', i.e. placed to build within communities, with insights into materials and processes.

Legacy: Housing for Good offers the opportunity to create embedded contextual legacies with citizens (of that place) that extend past one generation. *The Ecological Citizen(s) Network's* intention is to create an exciting opportunity that can be handed down, built on and become embedded within communities and the places they reside. A strategic suggestion is aligned with the international co-op model of governance. The co-operative model of enterprise is versatile and flexible. It can be "adapted to any sector of economic activity and takes the form of small and locally restrained businesses, as well as multinational conglomerates" (ICA, 2024). The key element to this typology of endeavour is the motivation for all parties, for example the 'donors' could be eligible for inheritance tax relief. The potential for adding 'Ecological Citizen(s) in residence' into planning legislation(s) could also provide accessible means to citizen(s). The authors foresee an overarching charity (or similar) that is established so that each 'chapter' or location cannot financially ruin the system. It would encourage local and contextual scenarios of use, giving parties protection, but enables appropriation by local elements aligning the autonomy expected in Ecological Citizenship.

2.3 Opportunities

Re-appropriation: The important challenge is how communities can 're-appropriate' the concept, so it is elastic in terms of how it can be used 'with communities' but has a clear structure, safeguarding and means. This is paramount, as the intention is to unpack 'existing systems' that could enable the time-poor (Sullivan, 2008), providing accessible opportunities for contextual scenarios. Those scenarios need to be selected by those in the setting, i.e. the citizens. A process that is being considering is a franchise charity that has many local elements within an umbrella concept, and this would protect each organisation, independently. There are multiple opportunities to address loneliness or create more community cohesion, based on increased communication. There is great potential for places to embed locals who might not be able to otherwise afford to stay in the area.

Models: The main element are the models for how this would operate; for example: a commission, an organisation owns all the assets (the houses and the leases) or a more locally adaptive role where charities are matched with homeowners. The opportunity here also needs to build off existing laws, legislation and restrictions.

Reform: A recurrent point was finding ways in which any system(s) can 'fail to safe', i.e. whatever happens all parties are safe and not compromised. The opportunity to have ecologists, rewilding experts or ecologists within the place you call home opens new normal(s).

Governance: This is the largest challenge; the terms, conditions and who dictates those elements. This includes the terms and conditions of how we 'design for exit', before we have even started. It also has the conditions of trust and social contracts that need clarity. *Re-Permissioning the City* (2025) is an interesting parallel, its portfolio of tools introduces a citizen-centered approach to managing spaces, enabling adaptive and evolving rules based on real-world feedback. It opens the city for all kinds of civic activities by granting citizens convenient access to one of the city's most vital assets — space. The Housing for Good initiative requires a default governance process that protects the place-based

interests and the people. A hard challenge, as at some point there will be an abuse of power, even if unintentional, and this initiative operates outside of government legislation, as it is about hyper-local concerns. The practices of how it protects all parties and does not invite abuse need: navigation, creation and debunking for transparent opportunities as a piece of further work.

2.4 Conclusion

The article unpacks a specific instance of co-designing benefits for people and nature: trialling more inclusive and accessible strategic design methods, through housing provision. We build on *Visions of Climate Futures* providing metrics for climate action to include: "what brings you joy, what are you good at, what work needs doing", with a fourth value 'What should supported communities have access to' and supporting people in stable housing is step one (Johnson, 2024, p. 424). Embedding these opportunities for true support within our local ecosystems is vital and a core step to enabling these types of opportunities to be accessible. Within design practices there is often pressure to create material goods, rather than shift systems.

> "We don't need more [economic] growth to improve people's lives. We can accomplish our social goals right now, without any growth at all, simply by sharing what we have more fairly and by investing in generous public goods" (Johnson, 2024, p.179).

Housing and the 'places we call home' are complex, but they can be used to create capacity for people to deploy Ecological Citizenship. The bigger question is how we can continually build skills with citizens, to be strategic without eternal unproductive, unfunded dialogue. The workshops demonstrated the potential of concepts that should be locally appropriated, as the power relationships must be with citizens. The difference over other examples is the agenda for creating a place that is accessible to all, rather than just the financially or time rich. The Housing for Good concept is a design-led charitable entity with enormous potential for co-designing benefits for people and nature: trialling more inclusive and accessible strategic design methods. Like any material or process, the organisation and designer(s) need to define the boundaries of their remit. The following are the next steps in the Housing for Goods Development.

Scenario 1: Authors share the idea and case studies, without supporting its development.

Scenario 2: Create the Housing for Good concept and legal language available for charities to adopt.

Scenario 3: Develop a match-making service, to sign-post people to selected charities. Including registration and delivery standards that need to be upheld.

Scenario 4: Launch a charity that owns Housing for Good residencies that can house people working for good through charities or their own projects. Purpose built or renovated, the residence could house individuals, groups and families, with shared spaces and tools for collaboration.

2.5 Future Work

The Housing for Good concept demonstrates countless benefits to societies and overall should be truly accessible. The design space sits beyond the realm of volunteering as it is only viable for the time rich and opens new means for charitable organisations. Finally exploring place-based governance models in more depth is required. The role of the designer—as mediator, convener, or system-builder and ethical boundaries, needs unpacking in further work.

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HYPERLOCAL ECOLOGIES. ECO-SOCIAL DESIGN PRACTICES FOR SYMBIOTIC CONNECTIONS.

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ABSTRACT | This paper presents a critical reflection on how hyperlocal design practices can help to address the current ecological challenges. It explores new forms of symbiotic coexistence between community and local territory as a possible alternative to contemporary problems.
The educational and research approach adopted promotes an eco-social design model rooted in the territorial context, through the combination of endogenous resources - such as native plant species, biomaterials and biological waste - with the active involvement of local communities.
The research focuses on the Venice Lagoon, a unique environment characterised by a delicate balance between social, cultural and ecological systems, where the urban form is permeated by water and the rhythms of life are marked by the tides. In this context, the rapid spread of civic actions represents a concrete possibility to develop a symbiotic relationship between the community and the lagoon socio-ecological system, favouring alternative ways of interacting with nature and local resources.
In recent years, our research experiences have focused on the relationship between the local context and the relevance of design in supporting such ecological practices. This is why they carry out experiments at an educational level.
In particular, this article presents and analyses the experimental activities conducted within the CTRL + Junk Lab Study Centre of the Iuav University of Venice. These projects promote production processes based on the use of local natural resources through forms of ecological activism that enhance the lagoon territory. The outcome of these investigations is the definition of the *Hyperlocal Ecologies Framework*, an educational and

design model aimed at developing hyperlocal design strategies capable of responding to the challenges posed by climate change and directing design attention towards alternative systems, in tune with the social and ecological dynamics of the local context. This methodology offers an alternative direction, reinforces the symbiotic coexistence between community and territory and design practice, and highlights the potential of design in fostering positive changes in the systems in which we live.
This paper emphasises the relevance of recovering and enhancing traditional knowledge systems and local biocultural practices by stimulating new forms of relationships between human beings, the environment and everyday objects.
Furthermore, the research highlights the need for an evolution in design education towards a hyper-contextual dimension that not only represents an opportunity for the discipline, but also a model of concrete intervention for the territory. In this way, design becomes a medium capable of actively responding to the ongoing ecological crisis, proposing adaptive and ecologically compatible solutions for the future of the communities and places in which we operate through design.

KEYWORDS | ECO-SOCIAL DESIGN, HYPERLOCAL DESIGN; SYMBIOTIC DESIGN; ENDEMIC MATERIAL DESIGN; LOCAL ACTIVISM

1. Introduction - Research directions

The paper aims to investigate how hyperlocal design practices (Fagnoni, 2022) can contribute to responding to the progressive deterioration of material and social resources (Wizinsky, 2022), and the ecological crisis (Morton, 2018; Franz, 2022) by combining local resources - endogenous plant species, biomaterials, waste - with the civic communities of the territory.
The climate regime (Latour 2018) is not only about ecological crises. However, it concerns political and cultural-historical issues, as well as ethical and epistemological shifts in perspective, from which a critical and participatory relationship with our living world begins.
It is crucial to examine the contribution of design in bottom-up practices with local communities for spreading awareness about the value of social and natural relationships.
The contribution explores the context of eco-social design, with references to the literature on the topic and through the framing of concepts such as 'hyperlocal design', 'symbiotic design', 'indigenous design' and 'biocultural design practices'.
Subsequently, the Venetian context is described, where educational and research initiatives on the topic are underway. These initiatives are characterised by the relationship between the social, economic, and cultural system and the ecological-natural system with which it interacts (Bookchin, 2021).
In particular, there will be a focus on experimental project initiatives related to the CTRL + Junk Lab Study Centre of Iuav University of Venice. These initiatives promote the adoption of local production processes, the use of endemic material (Karana, et al, 2015) and natural resources, such as biological waste and plant species, through ecological practices of local activism (Priola & Manfroni, 2024) useful to enhance the context of the Venice Lagoon.
The output of our critical investigations is the *Hyperlocal Ecologies Framework* an educational methodology oriented to ecologically appropriate hyperlocal design practices.
It provides a possible direction for research and project practices to address the critical issues and questions presented by climate change, through the connection between civic

realities, project and territory.
The presentation of the developed concepts aims to highlight and demonstrate the need to adopt a hyperlocal perspective to address complex challenges and to share a proposal of possible alternative design approaches. The proposed framework, which is still in the implementation and testing phase, is dynamic and rhizomatic and represents a design flow mapping that acts in specific contexts and interacts with heterogeneous design practices and civic actions of the realities rooted in the territory.

2. Different forms of eco-social design practices

The increasing environmental, social, political and economic crises highlight the urgency of reviewing the logic and dynamics characterising production and distribution systems. In response, design acts and takes root in specific territories and contexts, promoting relationships of proximity and circularity, and initiating critical reflections on the future of contemporary society.
The relationship between human beings, land, natural resources and social relations is a crucial element in addressing the current environmental crisis (Elhacham, et al, 2020). These aspects pose complex design challenges, which require drawing from theoretical knowledge from different disciplines and integrating social and ecological practices capable of overcoming an anthropocentric vision (Crutzen, 2006; Steffen, et al, 2011).
Design actions today are taking place within a social context that is already full of spaces, structures, objects, rubble and soil to be reactivated (DelSesto, 2022). Design is thus faced with complex realities and has to cultivate both a design capacity and a social imagination in order to re-act, in ways that are in line with the cultural and ecological needs of local realities.
In this sense, design is configured as a transformative discipline that can contribute to delineating and fostering an eco-social cultural transition (Fettes, Cole & Blenkinsop, 2024), represented by the intersection of ecological and social sensibilities, deeply intertwined components that historically characterise the discipline of design (Papanek, 1972; Maldonado, 2022).
In response to the ongoing climate crises, we are witnessing the spread of different ecologically and socially appropriate practices Table 1 and design approaches based on a deep connection with local contexts and the natural world, capable of reformulating and redesigning potential desirable futures.
This is a heterogeneous set of eco-social design practices and projects (Vacca, et al, 2022) that aim to contribute to a necessary transformation of the relationships between humans and nature, which are opposed to the extractive logics that have dominated the context and natural resources to date. They represent how design practices based on critical dialogue with civic realities rooted in the territories (Manzini & Thorpe, 2018; Villari, 2021) can foster processes of cooperation and hyperlocal relations, understood as a system of collective practices of involving active citizens in the development of potentially transformative solutions.
The shift proposed by Hyperlocal design (Fagnoni, 2022) consists in rethinking, repositioning and practising design activities within specific contexts, in a strictly local relationship, through the interdependence between people, resources, spaces and objects (Crippa & Fagnoni, 2024). In these hyper-contextual practices, design arises in relation to specific contexts, rather than as an exogenous element at high risk of rejection (Cardini, 2022). It thus empowers the possibility of imagining solutions from local resources available within the community, such as activities, materials, technologies, habits, and enhances traditional territorial skills and knowledge (Fagnoni, Manfroni & Priola, 2024).
The thesis supported by the authors is that through the adoption of hyperlocal design practices, design reconfigures itself as an interdisciplinary, distributed, plural and collaborative activity. Combining design knowledge with tacit knowledge of ecological heritage and related

material use practices, it can promote the development of culturally appropriate design solutions (Author, 2024) and in line with eco-social dynamics.
In the contemporary world emerges a cultural paradigm characterised by forms of ecological responsibility in which individual and collective well-being is based on the propensity for cooperation between humans and non-humans and the relationships between living beings and the environment (Lovelock, 1979; Kohn, 2021).
Symbiotic design-oriented research approaches manifest themselves, focusing not only on the design of individual artefacts, but of relational systems with nature, which promote renewed coexistence between living species and heterogeneous systems (Naess, et al, 2010).
In this sense, there is a proliferation of collective design strategies and modes in which designers promote ecological-symbiotic relational practices, implementing locally-based solutions to global problems and collectively building tools for survival (Yuan, 2024).
Moreover, new perspectives emerge, in which humankind is not just the passive beneficiary of the benefits nature can provide, but can help protect, proactively manage and restore natural ecosystems by contributing to addressing critical societal challenges.
Through the adoption of nature-inspired design approaches (Myers & Antonelli, 2012; Author, 2024) and Regenerative design (Lyle, 1996), projects aim to reverse the degeneration of natural systems through co-evolutionary perspectives (Mang & Reed, 2020).
The connections between humans and nature, although weakened in many contexts, remain strong in some communities, such as indigenous peoples (Borgnino, 2022) and other local realities that have maintained a close relationship with their natural environments. These relationships have given rise to adaptive cultures, shaped by reciprocal interactions with nature and Indigenous design practices (Watson, 2020).
However, the continuing loss of global biodiversity and the decline in cultural diversity raise critical questions about the relationship between culture, heritage and nature, highlighting the need for integrated approaches to address ecological crises.
The concept of biocultural diversity offers a perspective based on the interdependence between humans and the biosphere, recognising the complexity of socio-ecological systems as a network of dynamic, non-linear relationships that emphasise the interconnection between natural processes and human activities – Figure 1.
Today, thanks to the convergence of the social and natural sciences, the dichotomy between ‘nature’ and ‘culture’ takes on a new perspective, in which the intrinsic value of the environment is increasingly recognised in contemporary ethical thought and practice.
This relational vision leads to a greater awareness of interdependencies, inspiring concepts and practices such as Biocultural design and Terroir design (Rigobello & Evans, 2024). Design practices related to the concepts of bioregion and terroir offer further insights into the integration of ecological culture into product development.
The bioregion constitutes a framework of collective consciousness, where environmental conditions influence human life and culture. In parallel, terroir is a notion related to the relationships between place, cultural traditions and ecology, and provides a useful model for developing production systems anchored in the specificities of a territory and its resources (Paxson, 2010).
Common to all these perspectives is the valorisation of eco-social aspects as critical elements to enable individuals to locate and root themselves strongly to specific territorial dynamics, valuing the coexistence of multiple cultural and social realities and supporting plural visions of progress.
In line with the concepts of pluriverse and Ontological design (Escobar, 2018), these practices acknowledge the interdependence between humans, nature and technology, moving away from anthropocentrism to promote practices rooted in local particularities and co-generated with communities. These approaches aim to deconstruct the extractive logics typical of modernity, favouring future, equitable, pluralist and relational futures and offering strategic conceptual tools for design research and practice.

Table 1. Different forms of eco-social design practices.

Eco-social design practices	Social and ecological values	#
Hyperlocal design	Encourages the development of culturally appropriate design solutions starting from the local resources available within the community, such as activities, materials, technologies, habits, and enhancing traditional territorial skills and knowledge	local resources; endemic species; biomaterial; tacit knowledge; local activism; civic engagement
Symbiotic design	It integrates the relationships between living organisms and the environment, creating ecological and social systems that foster coexistence between humans, nature and other species. Combining natural experiences and behavioural changes, it develops design solutions to reduce human impact on ecosystems and promote a synergy between organic and inorganic life	ecological integration; multispecies interconnection; human-environment mutualism; biocentric design; living systems integration; interspecies
Regenerative design	Aims to restore, renew and revitalise ecosystems and communities by generating systems that actively contribute to environmental regeneration, promoting ecological balance and social well-being through co-evolutionary processes and nature-inspired strategies	ecosystem regeneration; coevolution; biophilia; nature based solution; waste regeneration; ecological restoration
Biocultural design	Integrates local cultural and biological diversity to promote rural and local community development by integrating traditional knowledge and practices to connect with the environment	biocultural diversity; local community involvement; traditional knowledge; holistic approach; bioregional; local biological resources
Terroir design	It promotes ecological and social diversity, valorising bioregional specificities, multi-species relations and the identity of a place through a relational and multi-sensory dimension rooted in the interconnections between nature, culture and community	bioregional approach; multispecies relationships; biocultural interconnections; local identity; eco-social diversity; cultural relevance
Indigenous design	It draws deeply on the cultural and environmental values of indigenous communities, integrating traditional knowledge and practices to develop adaptive solutions through the use of local materials and production techniques that minimise environmental impact while conserving natural resources	cultural relevance; community engagement; holistic approach; tacit knowledge; traditional practices; local materials
Ontologic design	It promotes the development of design solutions based on the interdependence between human beings, nature and technology, through equitable, pluralist and relational practices rooted in local specificities and co-generated with communities	holistic approach; multispecies relationships; pluriverse; radical interdependence; decoloniality; political

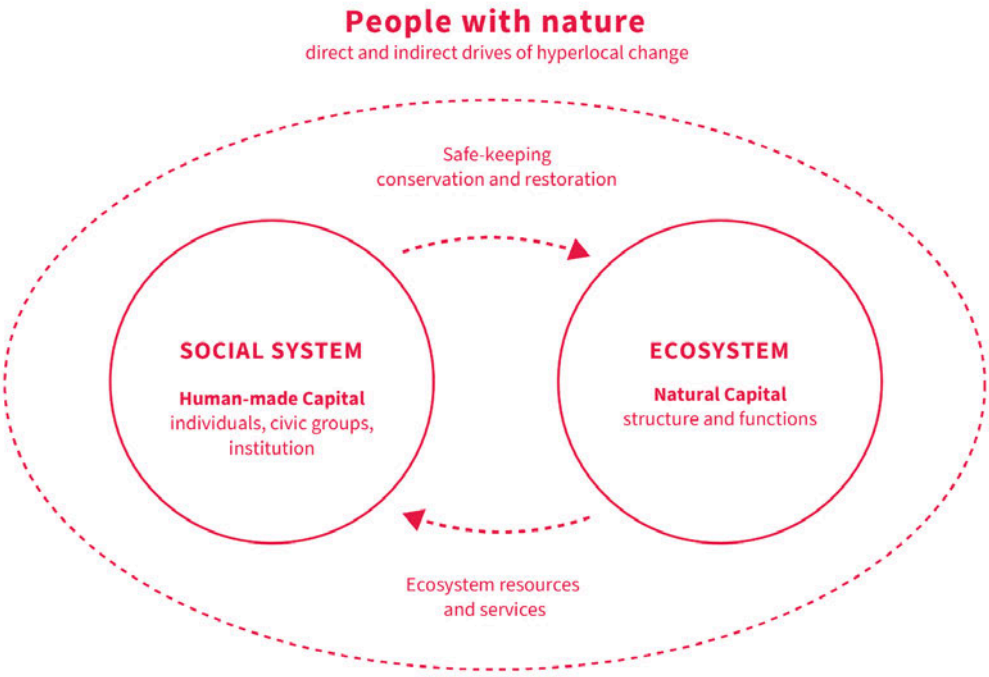

Figure 1. Conceptual diagram of social-ecological system reviewed by the authors on Resilience Alliance, 2007.

3. Method - Research activities and design practices

This paper analyses project experiences based on cooperation with civic realities, which operate for the promotion of local biocultural practices and knowledge. They are characterised by the adoption of local production processes and endemic material resources, through ecological practices of local activism with co-evolutionary perspectives.
The case studies presented belong to the CTRL + Junk Lab Study Centre of Iuav University of Venice and concern experimental project paths in which the collaboration between designers and associative realities re-activates a dimension of hyperlocal development.
In particular, the developed methodology was tested in the design of products and civic interaction spaces within the Venetian context. It was implemented in the Interactive Design Laboratory and the Product, Service and Interaction Design Laboratory of the Bachelor's Degree program, as well as in the Civic Space Design Laboratory of the Master's Degree program in Product, Visual Communication and Interior Design at Iuav University of Venice.
The concepts developed are the outcome of a design activity that starts from an analysis of the existing realities, peculiarities and traditions of the Venice Lagoon. This process is characterised by the adoption of four main phases: *HLocal Design Research* (Phase 1. Context and local stakeholders discovery), *HLocal Design Thought* (Phase 2. Eco-social values and practices definition), *HLocal Design Scenario* (Phase 3. Concept and design scenario development) and *HLocal Design Value* (Phase 4. Activated interactions evaluation).

The first phase *HLocal Design Research* (Phase 1. Context and local stakeholders discovery), aims to investigate the reference context, through a direct interview with some appropriately selected local stakeholders: Third Sector groups and enterprises, small productive realities, associations. The observation turns its attention to the activity of the stakeholder trying to focus on cultural, relational and environmental aspects.
Through ethnographic observation and interviews with actors and operators in the area, it is

possible to frame a system of actions aimed at exploring and rethinking ways of enhancing local processes and resources.
Each of the civic realities identified is analysed through direct interviews using specific tools such as Table 2 analysis sheets, used during the visits.
The observational research allows to focus on strengths and weaknesses, but also to bring out eco-social values in relation to the activities and initiatives undertaken. Furthermore, the hyperlocal research phase enables the identification of project possibilities based on the direct needs of the stakeholders to initiate the next project phase.
In order to establish contact with the local system, the research activity involves the adoption of a series of observation tools (photographic documentation, video interviews, literary quotations) that enable the re-establishment of a strong link with local traditions and cultural aspects.
During the research phase, there is the opportunity to deeply investigate the local civic realities, with direct and indirect investigations, references to case studies, and in-depth study of specific studies useful to support the subsequent phase of defining project goals and directions.
In particular, this *HLocal Design Thought phase* (Phase 2. Eco-social values and practices definition), is based on the analysis of the collected information and the interpretation of the realities' needs in relation to eco-social design practices.
In the third phase *HLocal Design Scenario* (Phase 3. Concept and design scenario development) the design development of hyper-contextual solutions that specifically respond to the needs of the local community and the characteristics of the venetian context is initiated. This phase allows the development of different concepts and possible solutions through brainstorming activities, sketching, 2D technical drawings, 3D models, renderings, brochures and scale models.
In the fourth *HLocal Design Value phase* (Phase 4. Activated interactions evaluation) the developed concept is evaluated on the basis of the connections and relationships generated in the project contexts, the potential direct and indirect benefits for the stakeholders and the ecosystem effects. The relationships, processes and structures that connect the concept to the actors involved, such as associations and citizens, are analysed, promoting involvement and facilitating action between different stakeholders.
The evaluation phase allows for a critical reflection of the design and process aspects, useful to identify possible unintended consequences and potentials and to stimulate new perspectives and hyper-contextual relationships.

Table 2. Structure of the interview with civic realities.

Key point	Questions
Presentation	Who are they? What objectives do they set themselves? What are their areas of work? What kind of services do they promote? What is their legal form? Which members do they involve?
Analysis	What activities do they carry out? What is the target audience? With what activities are their goals achieved? What methods do they use to involve citizens?
Relationship with ecological practices	What is the relationship between the relevant civic reality and ecological practices? What tools, methods or projects do they implement to make citizens aware of ecological practices?
Relationship with social practices	In which spaces do they intervene? What is the relationship between citizens and the civic reality in question?

4. Scenario - Interactions, connections and design perspectives in the Venice Lagoon

The reference area of the research is the Venice Lagoon, an intrinsically dynamic and constantly evolving context, located between islands, mainland and waterways.
The morphological characteristics of the territory determine a system that is open to innovation and transformation and constantly searching for balance (Pace, 2023). If in other places modernity and urbanisation have radically changed the face of cities, Venice, characterised by the extraordinary uniqueness of its geographical context, could represent a paradigmatic example for the contemporary world (Pascolo, 2020).
In this sense, the city, whose urban form is permeated by water and the rhythms of life are dictated by the tides (VITAL, 2023) together with its surrounding lagoon, could represent a matrix of interconnected natural social capital (da Mosto, et al, 2020).
Over the millennia, the Venetian community has developed alternative ways of relating to nature and lagoon resources that represent an emblematic example of how human settlements can evolve in response to complex phenomena such as rising waters and environmental changes.
The fragility and diversity of the area have led citizens to develop a great sense of resilience and adaptability to the various difficult situations they face on a daily basis.
Local traditions, culture and ecological sensitivity, brought forward by the civic realities active in the area, are closely integrated with the scientific and planning priorities emerging in the contemporary world.
Venetian associations have a very positive impact on the territory and, through active work, promote plural perspectives and values that integrate socio-cultural connections with lagoon ecology.
Civic behaviours and actions shape the territorial and aquatic landscape, and represent contrasting actions to negotiate Venice's position in the modern world.
These actions represent a possibility of symbiotic survival within the socio-ecological system on the border between the ‘artificial’ and the ‘natural’, in a city often overshadowed by its past, overtaken by tourism, declining resident population (Basso, Fregolent, 2022) and widespread ecological degradation.
This unique environment, thanks to its mutability and dynamism, is an open and experimental laboratory, offering endless possibilities for exploration and experimentation into research and design fields. In this way, it is possible to develop and promote alternative practices that highlight the urgency of socio-environmental change and encourage critical reflection on the relationship between humans and the environment.

4.1 Proposals - Eco-social design concept

The development of project themes and scenarios for the lagoon, starting from specific needs, enables the valorisation of the area's cultural roots, strengthening the link with natural resources.
The realities involved in the project research are active in protecting the territory and developing the local economy, resisting the obstacles and difficulties imposed by the system in which they operate.
It is a plural network of actors, small groups, associations and cooperative realities that are activated to make community enterprise, revitalise disused spaces and local economies, share knowledge and assets, design short supply chains and circuits of solidarity in all fields (Fagnoni

et al., 2024).
The cases presented in Table 3 propose a hyperlocal design approach in the educational sphere and represent research, experimentation and design paths to be further tested in order to overcome excessively impactful design practices.
The selected concepts arise from the direct relationship with the civic realities of the territory and promote the adoption of ecological practices useful to enhance existing actions and citizens' commitment in the context of the Venice Lagoon.
InFermento by Arban C., Ceccon L., Favaro M. and Primon T. – Figure 2, designed in *Sitopìa* workshop is a food fermentation kit developed for Venissa, a company that offers environmental cooking experiences, and works on the recovery of vines adapted to the salinity of the lagoon on the island of Mazzorbo, in the most uncontaminated part of the Venice lagoon. The kit, designed to make the fermentation process simple and accessible to more people in the home environment, consists of two borosilicate glass jars, with an analogue system for venting excess gas, and a set of essential tools for preserving and enhancing food in a natural and environmentally friendly way.
An online service is also provided, which through the use of preparation sheets allows a virtual community to exchange knowledge on fermentation techniques and methods. InFermento provides a safe and simplified experience, ideal for beginners. The kit guides you step by step into the world of home fermentation, allowing you to easily transform fruit and vegetables into fermented foods. In addition, the project promotes the reduction of food waste and the extension of food shelf life.

Figure 2. InFermento concept, Arban C., Ceccon L., Favaro M., Primon T.

Alofita by Beggiora V., Graziotto E., Oanta V. and Pagliarusco B. – Figure 3 is a project developed to address the expansion of saline areas and the regeneration of salinised soils in lagoon contexts such as Venice.
It stems from a dialogue with The Tidal Garden, a research laboratory that focuses on adaptation to climate change, and promotes the cultivation of halophytes, the plants capable of tolerating soil salinisation that thrive in saline environments.
Rising sea levels and the salt wedge phenomenon pose significant threats to agricultural land, compromising its fertility and the production of vital cultures for local food sustainability.
The device, equipped with a specific sensor, allows farmers to constantly monitor the salinity of

their fields, providing real-time data and indications on halophytes, suggesting how they can be used to rebalance the salinity of Venetian farmland.
The aim is to provide farmers with the necessary tools to tackle environmental challenges in an effective and ecological way, thus helping to preserve the valuable agricultural heritage of the Venetian region. Through this integrated solution designed to counter the complex dynamics typical of agriculture in lagoon contexts such as Venice.

Figure 3. Alofita concept, Beggiora V., Graziotto E., Oanta V., Pagliarusco B.

Toa, a project by Borogovac S., Egbo C., Pioli I. and Rainoldi G. is a nomadic, modular table and kitchen for public spaces. It stems from the reflection that the table and the kitchen constitute the central fulcrum through which the profound bond between the community that inhabits the lagoon and its landscape unravels. In line with the philosophy of Tocia! Kitchen and Community, an interdisciplinary collective based at the Spiazzi association in Venice, proposes a positive impact on the local community and territory through an idea of shared and participatory food.
Therefore, *Toa* is an artefact that acts as a catalyst for a space of conviviality, where the kitchen is in direct contact with the surrounding landscape. Furthermore, the ultimate goal of this artefact is to establish a true ritual around food preparation, creating a space for sharing and dialogue.
The system, which is easily disassembled and transportable, is designed to facilitate the organisation of the association's activities: workshops, pop-up dinners, experiments with raw materials, with the reuse of food waste, with edible vegetable species and with preservation techniques. One of the goals of this interaction is to provoke in diners a critical reflection on their natural surroundings.
Other concepts presented instead propose the adoption of local material and natural resources and can be considered as examples of waste treatment that follow processes of waste integration and regeneration.
Among these, *Refibra* by Cecchinato L., Gatti G., Gentile F. and Segna A., is a project created in collaboration with Sospiri Botaniche Veneziane, a company that produces local distillates using botanicals from the island of Sant'Erasmo, an oasis untouched by lagoon tourism, where attention and respect for the life cycle of cultivated plantations coexist.

Production is carried out with respect for traditions, rituals and wisdom, through the harvesting of vegetables, salicornia and aromatic plants typical of the lagoon. In particular, the project developed is based on the reuse of waste from the violet artichoke, a variety that grows on the island of Sant'Erasmo with specific qualities due to the unique properties of the soil and salty water of the lagoon. Through the adoption of Do-It-Yourself (DIY) waste regeneration techniques and the adoption of self-experimentation practices, a plant waste recovery process was initiated. The result is a semi-transparent bioplastic with fabric-like characteristics that, thanks to its distinctive aroma, texture and natural colours, is reminiscent of the plant elements of which it is composed.
El Barchin by Conti L., Damonte S., De Conti G. and Perchiazzi F., is a packaging composed of two main elements. The chitin and chitosan container is made from the waste from the processing of blue crab from the San Marco Cooperative - Pescatori di Burano, and also offers an environmentally friendly alternative to traditional plastic containers. Chitosan, derived from the chitin found in crustacean shells, is known for its antimicrobial properties and its ability to degrade naturally over time.
The second element is a perforated plate made of recycled Murano glass by Venetian start-up Rehub, which, through a process of recycling glass waste, transforms it into a paste that can be moulded at ambient temperature and injection-moulded or extruded using a 3D printer.
The *Alter_azioni* workshop (Costa & Fagnoni, 2023) includes bio-oriented projects experimenting approaches with natural materials that enhance their contexts. Among these is *Tressa* by Anderle M., Fabris G., Hyka A. and Vespini N. – Figure 4 is an open source product-service for the collection and reuse of algae, a natural element that is fundamental for the fragile balance of the lagoon ecosystem, but at the same time a versatile material in its adaptability of use. It is a material experiment begun following a discussion with biologists from the CNR-ISMAR in Venice and is based on the extraction of polysaccharides and other substances present in algae, used as a basis for the production of bioplastics that can degrade naturally over time.
The research explores the potential of non-extractive and often discredited local plant materials, such as invasive plants and algae, to contribute to an ecological and social transition.

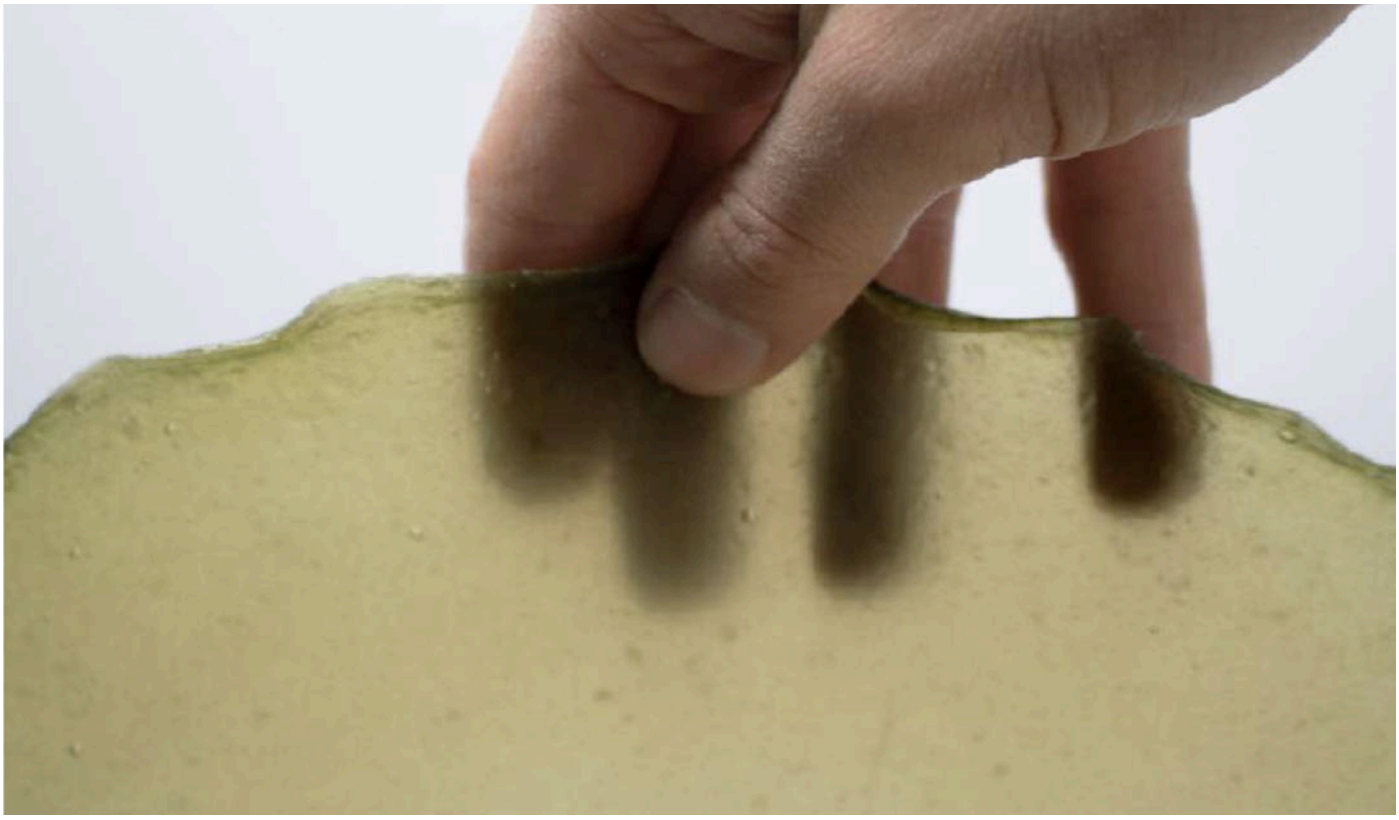

Figure 4. Tressa concept, Anderle M., Fabris G., Hyka A., Vespini N.

Finally, the proposed concepts focus on structures, systems and spaces aimed at fostering symbiotic relationships between humans, nature and other species.
The *Intersezioni* project by Marras, C., Rubino, F. and Scirè N – Figure 5, designed as part of the *Habi(li)tat* workshop, presents itself as a scenario of coexistence between man and other species, considered as his equals, through a design intervention aimed at supporting the evolution and organisation of the ecosystem that characterises the lagoon.
These structures are designed for the Vignole natural area, a state-owned area where VERAS operates, a non-profit association that involves and supports the local Venetian community through various social, cultural, and ecological activities. The objective is to move away from an anthropocentric vision of the project, with a view to respecting the times and modes of growth that belong to its inhabitants, people, fauna and vegetation.

Figure 5. Intersezioni concept, Marras, C., Rubino, F., Scirè N

BioMe by Arnoldi E., Dufour F., Serfilippi C. and Vit E. – Figure 6 of the *Inter_azioni* workshop is a floating space developed with the support of CNR-ISMAR, the Venice Institute of Marine Sciences, which carries out applied research in oceanography, biological chemistry and marine geology in the lagoon. It is a space designed to observe processes and climate variability, and to initiate pathways for the protection and sustainable management of the lagoon aquatic environment.
In particular, it is a platform that contributes to the restoration of the lagoon ecosystem by means of a reticular structure, located underneath, designed to generate an ideal habitat for marine organisms. In addition, a complementary space has been designed where users can be involved in processes of reuse and transformation of materials found in the lagoon by means of machinery to create biodegradable objects for everyday use.

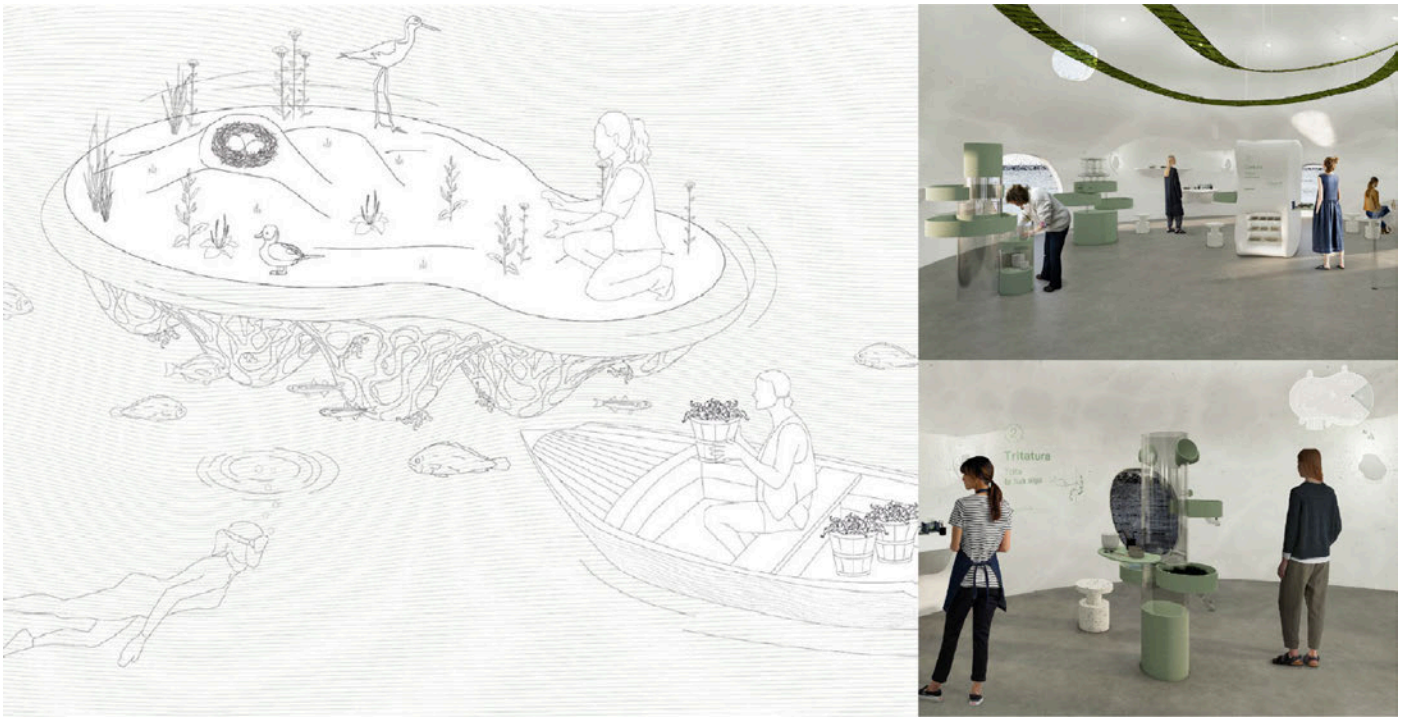

Figure 6. BioMe concept, Arnoldi E., Dufour F., Serfilippi C., Vit E.

Matassa by Stama D. is a thesis project that reimagines future living in the post-ancestral scenario, offering a possible response to the current climate emergency. The project presents a self-produced lagoon shelter, made of marsh reed and byssus, a waste product of mussel cultivation. This model proposes biophilic, energy-independent and adaptable living and, through the adoption of hanks of 'sea wool', creates walls, seats and beds in an organic flow, open to modification and change.
The decision to design in the lagoon responds to the need to address the climatic risks typical of the area, to dialogue with local fishing communities to understand, through traditional knowledge, the challenges and opportunities offered by local materials such as byssus and marsh reed.
The project proposes a modular and shareable shelter, designed to adapt to the instability of the lagoon. Going beyond the archetypal casone, it incorporates construction techniques that reduce the use of wood, contain material circuits and allow for modification and displacement, in keeping with a resilient and hyper-contextual approach.

Table 3. Eco-social design concept and Venetian realities involved.

Eco-social practices	Endemic material resources	Symbiotic relationships
InFermento Venissa	Refibra Sospiri Botaniche Veneziane	Intersezioni VERAS
Alofita The Tidal Garden	El Barchin Cooperativa San Marco Rehub	BioMe CNR–ISMAR
Toa Tocia! Cucina e comunità	Tressa CNR–ISMAR	Matassa Fishing community

5. Hyperlocal Ecologies Framework

Over the years, the exploration of progressively complex scenarios has led to an evolution in design approaches. It also leads to a consequent transformation of design culture and the set of methodological and practical tools that designers can adopt (Design Council, 2021).
In order to generate a positive impact, methods and tools to support design practice should encourage the adoption of strategic approaches to design (Design Council, 2005) and stimulate reflection during the design process (Stolterman, et al, 2008). Such tools should be designed to be intuitive, facilitate the externalisation of ideas (Daalhuizen, 2014), allow for new design perspectives, enable stakeholder engagement and relate appropriately to the context.
In order to offer designers support and guidance in managing the hyperlocal design process, which characterises one of the challenges of contemporary design, a *Hyperlocal Ecologies Framework* has been developed - Figure 7. A strategic mode of action that is useful to direct design attention towards alternative systems, in tune with the social and ecological dynamics of the local context.
It is a visual representation that describes the key steps to be taken in hyperlocal design.
This didactic-design framework aims to provide guidance to designers, who focus on integrating local resources, knowledge and practices to develop design solutions appropriate to eco-social dynamics. This approach enhances territorial skills and traditional knowledge, promoting symbiotic coexistence between human beings and the environmental context. It therefore represents a reference for the development of design solutions that are environmentally conscious and culturally relevant, which can promote the synergy between organic and inorganic life.
One of the objectives is to encourage the dissemination of experimental design practices and approaches in which the collaboration between designers and associations stimulates alternative development paths rooted in the local context.
The proposed design model, tested in the Venetian context during the development of design concepts pertaining to the CTRL + Junk Lab Study Centre of Iuav University of Venice, is divided into four main phases: *HLocal Design Research* (Phase 1. Context and local stakeholders discovery), *HLocal Design Value* (Phase 2. Eco-social values and practices definition), *HLocal Design Scenario* (Phase 3. Concept and design scenario development) and *HLocal Design Value* (Phase 4. Activated interactions evaluation) as described in paragraph 3 of the paper.
This promotes the development of culturally and ecologically appropriate design solutions through the following principles of hyperlocal design:

- Eco-social practices - Promotion of cultural and environmental values of civic realities by integrating traditional knowledge and practices to develop adaptive solutions that reduce impact and preserve natural resources. Promotion of local cultural and biological diversity by incorporating traditional knowledge and practices for the development of indigenous communities;

- Endogenous material resources - Enhancement of local material circuits through the development of production systems anchored to the specificities of an area and local resources, endogenous plant species, biomaterials and waste materials;

- Symbiotic relations - Integration of living beings and the environment, generating systems aimed at promoting connection and interdependence with the environment and coexistence between humans, nature and other species, through the adoption of pluralistic and relational practices rooted in the territory.

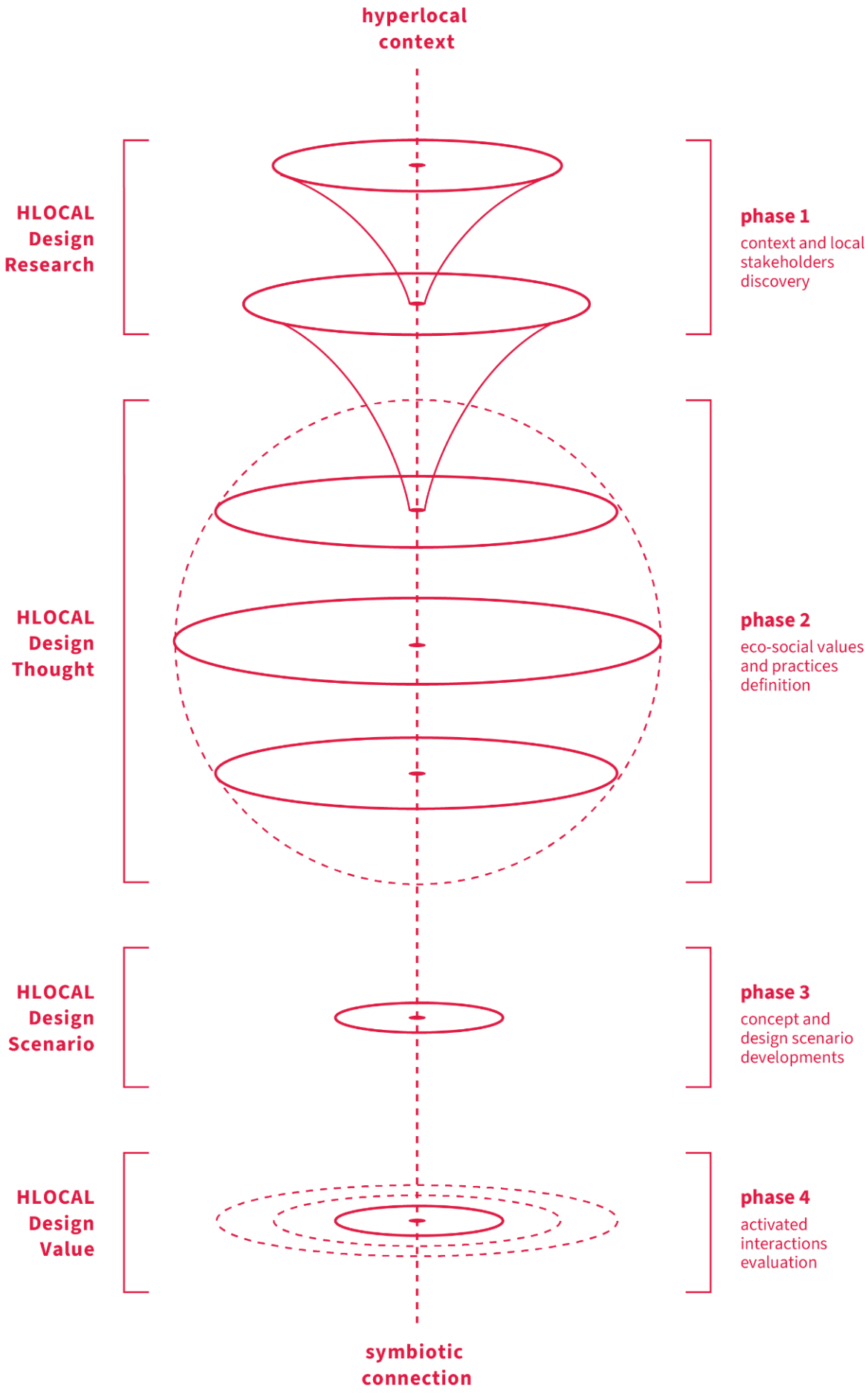

Figure 6. Conceptual diagram of Hyperlocal Ecologies Framework.

6. Discussion and Conclusions systemic innovation through rhizomatic relationship

This contribution emphasises the importance of orienting design education towards a hyper-contextual dimension. This can represent an opportunity for future experimentation for the discipline, as well as for the territory itself, and respond to the effects of the ecological disaster we are facing.
Starting from Papanek's thesis, on the social responsibility of the designer, many authors argue for the role of design as a non-neutral and democratic political agent (Monteiro, 2019; Manzini, 2015; Winner, 1979; Papanek 1971) as an activist practice (Fuad-Luke, 2013, Di Salvo, 2017), or even rhizomatic and cooperative.
This responsibility is connected to the intention and action itself of transformation that distinguishes design (Buchanan, 1985; Krippendorff, 2005). Our thesis, continuing in this direction, argues that what defines and identifies design is not the type of product, the form of the product, the production of goods (Celaschi, 2000). Rather, it is a process that allows us to explore what is most necessary for the maintenance of our contemporary condition overcome by climate change, technological evolution, extractive and destructive economic models of contexts (Maffei, 2024).
Thus, design is the action of shaping artefacts, products, services or product-services that can respond to the changing needs of the contemporary context, and/or imagine scenarios of use and systems of artefacts to keep the hyperlocal system and its intrinsic relationships alive.
How much more fragile, weak, and delicate a system is, how much more it can develop approaches and experiment ways to challenge this type of crisis. The case studies of the lagoon realities adopt critical attitudes to consumption by focusing on the development of new processes rather than new products, looking at open source, bottom-up processes, circularity of materials, social justice, and ecological transition.
This approach highlights how design practices can address global challenges and promote positive change through the ability to plan and produce desired outcomes (Mau, 2004). This idea emphasises the view that design is not confined to objects or spaces, but embraces the entire ecosystem of human interactions and eco-social solutions for the future.
This article proposes new research perspectives in the field of design, aiming at the rediscovery and enhancement of traditional knowledge systems and biocultural practices of territories (Fagnoni, Manfroni & Priola, 2024). The projects presented demonstrate an experimental approach that fosters a change of perspective. Through the artefacts and practices developed, strategies and tools of Hyperlocal design are outlined, highlighting the potential of this approach in guiding individuals and communities towards a positive change in the systems in which we live and in the future scenarios that we want to help build.
This paradigm shift is based on certain key principles. Firstly, the importance of rethinking production as an ecological system that allows for an experimental approach that includes the adoption of local materials and the recycling of natural waste. Secondly, the cultural and territorial heritage is enhanced through the valorisation of rituals, actions, products and craft practices and significant places. Finally, attention is drawn to the need to explore new forms of coexistence and symbiosis that respond to contemporary challenges (Fagnoni et al., 2024).
The research and educational experimentation perspectives that emerge from this work are based on socio-cultural values aimed at improving community adherence to restoration and protection. Aimed at motivating new actions, individual or collective, crucial for a more effective participation within the environmental and social protection process.
The hyperlocal approach, in this context, goes beyond merely meeting the needs of a specific place, it represents a more ambitious political and cultural perspective, which questions the future of life forms, the intrinsic value of places and the quality of coexistence. This approach promotes a conscious interaction with the complexity of social and environmental ecosystems,

recognising that design cannot prescind from the symbiotic coexistence of community and territory.
In its current phase, the research adopts an exploratory methodology aimed at analyzing experimental design trajectories that may inform future applications in everyday contexts. At this stage, the investigation is limited to eco-social dimensions, deliberately excluding economic and regulatory considerations, as well as questions of scalability and the negotiation between tradition and innovation.
Further empirical validation and the identification of measurable impacts are needed to substantiate the interdisciplinary potential of the approach. Future research may concentrate on the development of design strategies that foster critical perspectives, enhanced through comparative analysis with similar international initiatives and enriched by contributions from adjacent fields such as anthropology, social economy, and environmental sciences.

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Inter-sessions as governance in action.

How invisible moments of co-design are shaping institutional transformation.

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ABSTRACT | To address social inequalities in urban transformation, cities increasingly involve stakeholders and users in projects through co-design. These methods use cross-sectoral and systemic approaches that continuously adapt to evolving needs.
In this context, the city of Nantes collaborates with a community of actors to create the "Nantes Cooperative of New Solidarities," which aims to strengthen local solidarity and reimagine urban governance through participatory practices.
While research on co-design emphasizes the designer's role in addressing project challenges, transforming practices, and influencing stakeholders, it often overlooks the critical relationship between the design team and project governance, particularly with decision-makers. This communication aims to improve co-design practices by examining in greater depth how designers and pilots are involved in these co-design moments, highlighting the 'inter 'session issues, and offering insights into the steering mechanisms to be implemented.
Our current action research (February 2024 to April 2025) examines how the co-design function creates new design spaces at the steering level and helps establish new institutional frameworks, mainly when the goal is to create a cooperative with heterogeneous players. We have observed challenges and legitimacy crises on all sides—within the steering, design, and community teams. Design plays a crucial role in strengthening community cohesion. However, it must also support the emerging entity formed by the co-design process that co-organizes the planning and steering. This paper contributes to the literature by identifying key tensions in co-design governance structures and proposing inter-sessions as a novel institutional mechanism for fostering generative collective governance. This signifies a shift from traditional consultancy practices that designers must consider in their co-design methodology, especially if they aim to make their intervention sustainable.

KEYWORDS | urban governance, collective action, co-design, collaborative learning, boundary objects.

1.Introduction

With social inequalities exacerbated by urban transformations, cities are increasingly prioritizing participatory approaches. Initiatives based on co-design aim to combine skills and perspectives to create innovative solutions tailored to local needs. In this context, the city of Nantes has launched a creative project to bring together a diverse community of stakeholders to co-design the "Nantes Cooperative of New Solidarities." The key objective of this project is rooted in the belief that developing new solidarities depends on cross-sector cooperation. Therefore, the project seeks to connect different spheres and foster the emergence of a community capable of generating groundbreaking solutions, where each stakeholder contributes according to their abilities while benefiting from the co-created services.

Many local governments are exploring innovative approaches through collaboration and cooperation (Coblence & Pallez, 2015). They are adopting co-design to develop new systems, infrastructures, or public services (Bason, 2014; La 27e region & Scherer, 2015; Trischler et al., 2019) to foster creative scenarios and public policies (Bason & Schneider, 2014) and to support the transformation of public action (Gwiazdzinski, 2015; Poudray, 2021).
In our case, the co-design involves creating an original cooperative. The aim is not to transition from public service to citizen service (Liénard, 2016) but to create a new form of collective action with yet-to-be-defined modalities.
From the beginning, the municipality recognized the importance of forming an initial community of various stakeholders to develop the project collaboratively. This early recruitment effort, conducted before involving external providers, demonstrates a keen insight: the need to unite a design community capable of co-designing and testing a beta version of the cooperative on a real-life scale.
This initiative has a dual ambition: to strengthen local solidarities and reinvent urban governance through innovative participatory practices.
While co-design has been extensively studied as a participatory design practice, its role in reshaping governance models and influencing strategic decision-making remains underexplored. This research investigates how co-design, particularly through inter-sessions, contributes to the emergence of new governance frameworks. By focusing on institutionalizing collaborative dynamics, we explore how co-design can transition from a project-based tool to a core component of urban governance.
To structure the approach, the local authority assembled a pilot team and hired a project facilitator to manage and coordinate the cooperative. It also chose to rely on the support of an external provider (a design team) for the methodological aspects and process evaluation. The pilot and design teams will work together in "co-designing the co-design" (Chamberlain & Partridge, 2017), which implies that the process is developed collectively. It emphasizes the dynamics of team interaction rather than focusing solely on the product or outcome. According to the authors, the goal is to transform practices, behaviors, and organizational culture. Based on the belief that everyone teaches and everyone learns, this process aims to co-create the object and establish a new way of working together as a team (Chamberlain & Partridge, 2017).

Yet, even when these mechanisms are intentionally designed to foster collaborative and

reflective practices, their effectiveness often remains constrained by deeper structural limitations. In this regard, Gwiazdzinski (2015) observes that the lack of dedicated structures for research development or foresight and the slow adoption of methodologies like project-based approaches considerably hampers transformation processes. These insights raise several questions regarding how such initiatives can be supported.
Do they require a specific structure, and how can that structure fit into existing organizational dynamics? Furthermore, what factors affect the project's sustainability and autonomy when support depends on external providers? Finally, how can we create institutional spaces or mechanisms that sustainably support these processes while integrating them into the existing systems of organizations?
Conducted from February 2024 to April 2025, our ongoing case study serves as action research (Avison et al., 1999). It provides us with essential tools to explore the co-design of a new form of collective action by employing various data sources (Baxter & Jack, 2008, p. 544; Muratovski, 2016). This data includes participant observations, notes from our ethnographic journal, and semi-structured interviews conducted with the teams. Our empirical contribution is descriptive, and this case was selected because it represents a municipality committed to engaging its stakeholders at the highest level of participation, as defined by Arnstein (1969).

Despite the growth of participatory methodologies and co-design, the literature mainly focuses on designers' roles in defining problems and transforming practices. In contrast, it rarely addresses the relational dynamics between design teams, project sponsors, and project governance. This gap raises questions about the organizational and communication levers required to foster an environment conducive to such transformations.
This article explores what occurs during the "inter-sessions" (Dubois, 2015, p. 164), where co-design is prepared and structured. The objective is to analyze how the co-design functions integrate into these preparatory moments and, by extension, into the future cooperative. Our study emphasizes the significance of a collaborative approach in these inter-sessions to introduce co-design practices and culture into the upcoming organization. This strategy aims to foster a horizontal dynamic within the pilot team, thus encouraging the long-term engagement of all stakeholders.

This study contributes to discussions on participatory urban governance by identifying inter-sessions as critical yet overlooked governance mechanisms. By analyzing tensions between institutional control and collaborative practices, we propose inter-sessions as a generative framework for sustainable co-design. The paper also introduces a concrete typology of inter-sessions and outlines the conditions under which they can develop into strategic tools for institutional transformation.
After presenting our methodological framework, we will analyze how the co-design inter-sessions serve as spaces for coordination and mediation, emphasizing their role as critical moments in the collaborative dynamic. We will then highlight how the cooperative's pre-configuration phase underscores the vital importance of generative collective governance that sustains practices, shares co-design expertise, and the essential functions necessary for its operation.

2.Methodology and posture

The formalized co-design framework, which brings together various stakeholders—such as associations, municipal services, residents, and businesses—is the foundation of this approach (see Figure 1). However, as Dubois (2015) emphasizes, the "inter-sessions," which include informal or intermediate phases such as preparation, informal exchanges,

and opportunities for reflection, play a critical yet often overlooked role in shaping the project's overall dynamics.

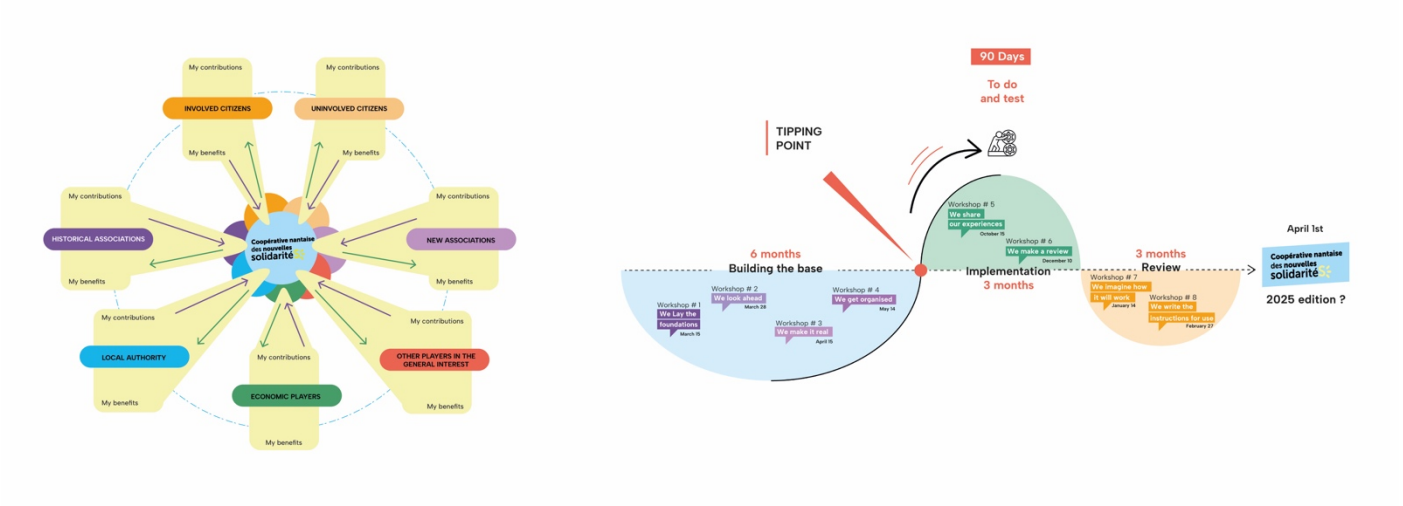

Figure 1. The cooperative's co-design approach.

Our methodology adopts a pragmatic approach to analyzing concrete situations and interactions to understand social dynamics and the justifications put forward by actors within their context (Barthe et al., 2014). We chose a qualitative case study framework to collect diverse data (Baxter & Jack, 2008; Muratovski, 2016), including photographs, transcripts, semi-structured interviews (Boutin, 2018), and an ethnographic journal enriched by reflections and discussions with the design team. Anchored in action research (Avison, 1999), our approach involves active participation in co-design workshops, "inter-sessions," and collective reflection activities (Bastien, 2007).

This iterative cycle of observation, action, and reflection aims to produce knowledge and foster practice transformation (Morrissette, 2013; Raîche-Savoie & Déméné, 2023). We aim to deepen the understanding of co-design situations at the steering level to enhance professional practices, encourage individual and collective empowerment, and support organizational change.

To guide our analysis, we developed a framework inspired by Chaudet (2012), who proposes methods for describing processes related to the evolution of organizational practices (Figure 2). This framework examines multiple dimensions of these processes, including human and non-human actants, actions, interactions, the instituting or de-instituting nature of situations, traces and memories, coordination practices, and their temporalities.

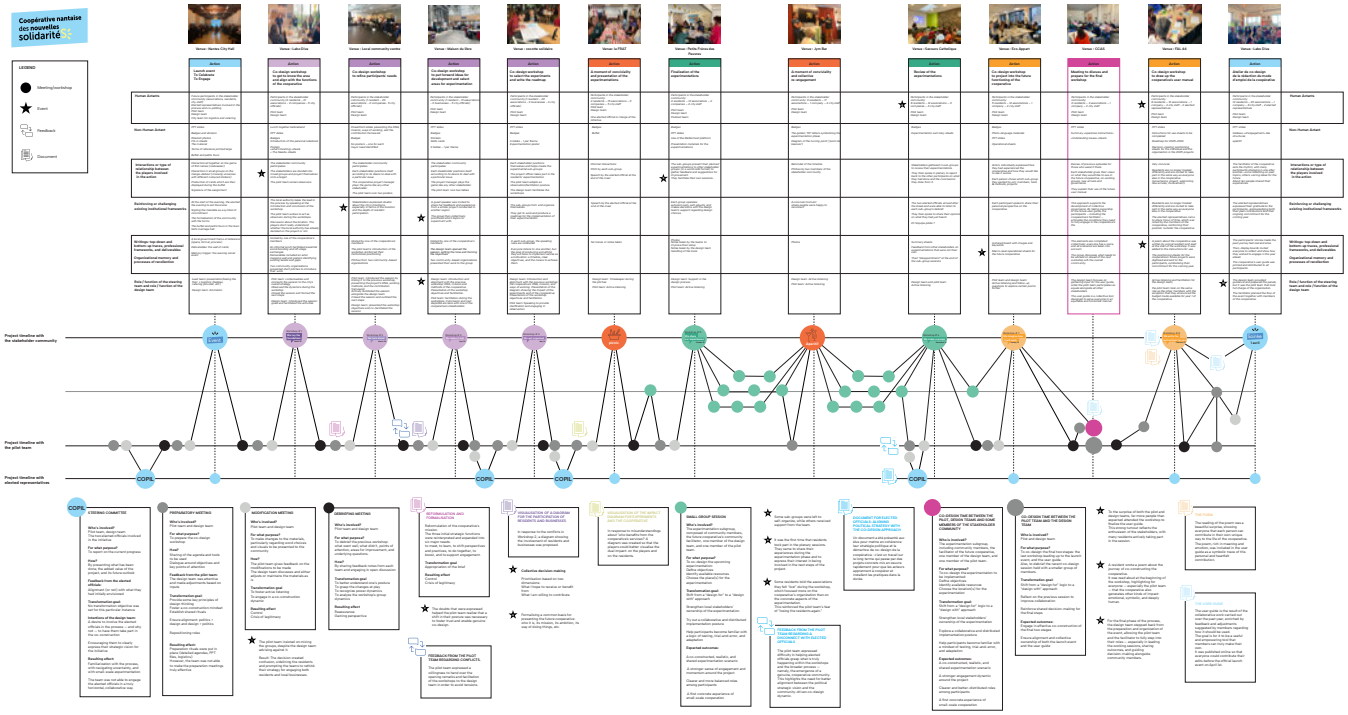

Figure 2. Inter-session analysis grid

2.1 Understanding mediation through the analysis grid

The analysis grid revealed how inter-sessions operated as mediating interfaces between actors, expertise, and levels of responsibility. By examining the configurations of actants, the nature of interactions, their instituting or de-instituting effects, and the traces they produced, we identified how these spaces facilitated the translation of strategic visions into actionable frameworks, the negotiation of roles and postures, and the reduction of misunderstandings between political, operational, and design cultures.
By **mediating functions**, we refer to the practices that enable translation between different professional languages, articulate strategic and operational levels, and align visions and expectations across diverse actors. These functions were central in fostering the process's collective appropriation and maintaining coherence across the project's various scales and rhythms.

The analysis highlighted three key mediating functions within the inter-sessions (see Figure 3): translating strategic language into operational terms, articulating between different professional cultures, and facilitating mutual understanding. These practices appear essential for sustaining shared governance dynamics, often supported by tools, artifacts, and facilitation postures.

Type of inter-session	Main objective	Transformation goal	Mediating function	Expected outcomes	Timeframe
Strategic Alignment	Framing the issues collectively Identifying points of tension	Clarifying and sharing strategic visions Adjusting the methodology to remain aligned with ambitions Reassessing objectives when necessary	Translating political intentions into concrete design frameworks Facilitating back-and-forth between strategy and action Bringing about a shared language between leadership and on-the-ground actors	Shared Strategic Visions A methodology realigned with the project's ambitions A strengthened cooperation dynamic between different levels of leadership	Pre experimentation Recurring
Co-design mediation	Promote acculturation to co-design: principles, timelines, tools Establish a shared posture toward exploration and experimentation	Clarify the differences between design, political, operational, and institutional cultures Legitimize expectations of quick results Encourage a shared understanding of "doing with" rather than "doing for"	Translate design logics into political language Facilitate acceptance of uncertainty as a driver of creativity	A better mutual understanding Stronger buy-in for co-design approaches A collective ability to navigate the grey areas of the project	Ongoing
Workshop preparation	Define the content and sequence of workshop activities Organize logistics Ensure alignment with the overall trajectory of the project	Align team members on intentions and individual roles Adjust or clarify roles based on context and evolving needs Anticipate potential reactions or points of resistance	Create a space for dialogue between design, politics, and the field Anticipate tensions and misunderstandings Manage differences in posture and positioning	Smooth and clear facilitation of the session A coherent and unified team posture during the workshops Collective ability to adapt if needed	Before each workshop
Collective debriefing	Analyze how the workshop unfolded Share impressions, observations, and points of attention Highlight gaps between intentions and what actually happened	Encourage a reflective posture Support mutual learning Cultivate a shared culture of reflexivity and experimentation	Horizontalize perspectives and interpretations Value all voices equally, regardless of role or status	Continuous improvement of collaborative practices Strengthened trust within the group Greater ability to recognize tensions without avoiding them	After each workshop
Planning Adjustment	Review and revise the initial schedule Recalibrate upcoming deadlines and project milestones Restore shared visibility for all stakeholders	Accept unforeseen changes collectively Co-prioritize upcoming actions based on available resources Establish a culture of agility and adaptability	Synchronize different timelines (political, operational, collective) Reduce tensions linked to time pressure Create space for collective prioritization	An adjusted and realistic plan Renewed commitment to shared and achievable objectives Increased transparency around individual and collective constraints	Recurring
Transmission & Documentation	Organize the archiving of outputs, decisions, and learnings Make both formal and informal knowledge generated through the experience transferable	Institutionalize learnings so they become actionable resources Build bridges between experimentation and long-term structural anchoring Make visible the value generated collectively over time	Create a shared, accessible, and transferable memory Acknowledge each person's contributions and give them lasting visibility Value lived experiences beyond the moment they occurred	A shared knowledge base, useful for new participants and future project phases Improved knowledge flow among all stakeholders A stronger sense of continuity and belonging within the collective	Ongoing

Figure 3. Inter-sessions typology

This typology not only categorizes the different formats of inter-sessions but also helps reveal the often-invisible work of co-design: the mediation, preparation, alignment, and learning activities that sustain the collective dynamic and contribute to embedding co-design into governance practices.

3. Inter-sessions in Co-Design: Spaces for coordination and mediation

These interstitial moments provide the pilot and external design teams with crucial opportunities to align their methodologies, frameworks, and facilitation strategies. However, fieldwork uncovers disparities and conflicts between public action and co-design professional cultures, resulting in a crisis of mutual legitimacy.

3.1 Tensions between professional cultures

These observations can be interpreted through our analysis grid: tensions and adjustments were evident in the interactions among actors, the instituting effects on role distribution, and the traces left by the decisions and tools created during these inter-sessions.

1. Variations in Mobilizing and Recruiting Stakeholders

The pilot team formed a community of 40 actors before the design team became involved. While the goal of ensuring diverse perspectives was achieved, this number proved too large for effective co-design. The design team faced challenges in profoundly

engaging with such a large group, mainly because of the time-consuming debriefing sessions with all participants. Furthermore, only a few participants were fully engaged by attending all the workshops. Some defended their absences by comparing themselves to others, while others thought their absence would not impact the group, ultimately undermining the continuity and coherence of contributions.
Another point of tension involved residents' roles, which were sometimes viewed as citizens and, at other times, as beneficiaries. This ambiguity sparked debates about their engagement levels and participation methods, necessitating adjustments to their involvement. The discussion centered on precarity and social isolation, complicating residents' integration into a group composed mainly of professionals. The pilot team advocated for their immediate inclusion on equal footing with professionals. In contrast, the design team proposed a more gradual approach that involved preliminary interviews and increased participation during experimentation. In the end, most residents participated in the experiment.

2. From pilots to co-creators

Another point of tension has arisen regarding the role of the pilot team. Our observations indicated that, at the beginning of the process, the pilot team prioritized maintaining control over this flagship initiative, adopting a highly institutional approach. This mindset was evident during team meetings, where it shaped the objectives and conduct of the workshops, as well as the choice of terminology and communication medium. This control was also noticeable in the co-design workshops. Although the design team suggested more horizontal interaction with the stakeholders, the pilot team, alternating between the roles of observer and facilitator, consistently intervened at the beginning and end of the sessions, reinforcing a hierarchical dynamic within the community.
This lack of coordination undermined the legitimacy of the design team by limiting its ability to establish a genuinely collaborative framework. It has also hindered the development of the pilot team's skills as an active participant in the co-construction process, especially in its areas of expertise (solidarity, citizen dialogue). These challenges emphasize the need to clarify each stakeholder’s expectations, roles, and skills during inter-sessions to reduce misunderstandings and optimize collaboration.

As anticipated for fostering a genuine community of players, the implementation phase marked a turning point for the pilot team. During this period, sub-groups were organized to implement their projects. Each designer supervised two sub-groups, facilitating the sessions, guiding the experiments, and supporting communication. The cooperative’s project facilitator also played a key role, actively participating in the experiments and strengthening coherence and networking among the participants.
Initially positioned as sponsors, the pilot team members gradually became more involved in the design process, contributing their professional expertise to the initiatives. Interviews confirmed that, after the implementation phase, the pilot team viewed its relationship with the design team as highly complementary.
The implementation sessions provided an inclusive framework that encouraged constructive dialogue, diverse contributions, and effective co-creation. Differences in approach were addressed by focusing on shared objectives, which fostered a sense of co-responsibility and helped consolidate a common foundation for action. The organization into small sub-groups transformed the inter-sessions into genuine co-design spaces (see Figure 2), reinforcing cooperation dynamics and cultivating a culture of collaboration among participants.

3.2 Mediation functions: Synchronizing timelines and aligning ambitions.

1. Synchronizing timelines and supporting motivation

Our analysis indicates that these inter-sessions functioned as coordination forums for both teams to address various aspects and overlapping timelines. Meetings primarily focused on short-term actions, such as organizing workshops, mobilizing efforts, and advancing experiments, while also considering the overall methodology and medium-term visions for collaborative development. Broader discussions on community-building processes were also essential. Although less frequent, interactions with policymakers and elected officials supported the process, with regular project updates ensuring transparency and alignment between political strategies and overall experimentation. The coexistence of diverse timelines and priorities created tensions, emphasizing the need for consistent dialogue to align stakeholder goals.

Indeed, as a pilot team member noted, "We need to keep everyone motivated: ourselves, the elected officials, and the community." The success of this cooperative depends on maintaining the motivation and engagement of all stakeholders: the community of actors, often hesitant due to an unclear process; the elected officials, navigating a complex context and eager for tangible results; and the two teams themselves, who sometimes experience moments of discouragement.

2. Mutual influence and adaptability

Unlike traditional consulting services, both teams embraced collaboration, necessitating mutual adjustment and influence.
On the one hand, the pilot team shaped the designers' approaches by sharing their political constraints, priorities, and professional frameworks while stressing the importance of inclusion, particularly regarding terminology and materials.
On the other hand, the design team took the time to explain the steps involved in building a community through co-design, extending the process by four months to address concerns about its duration. They also highlighted the importance of creating a safe environment and fostering collaborative relationships. Over time, the pilot team became more willing to delegate facilitation to ease stakeholder tensions regarding locations, funding, and resident involvement. By adopting a more participative approach and engaging other community members during the inter-sessions, the pilot team was able to redefine its role. This resulted in greater stakeholder alignment and encouraged a collective redefinition of roles and expectations. Design decisions were made collectively, as each stakeholder became co-responsible for the experiment's success.

3.3 Inter-sessions as Spaces of Governance

Beyond their role in coordination and mediation, inter-sessions progressively emerged as key governance spaces within the project. Initially framed as opportunities for alignment and operational planning, these moments became where the rules of engagement were defined, strategic directions were discussed and decided, and roles and responsibilities were negotiated and clarified between participants.
Rather than simply supporting the co-design process, these inter-sessions contributed directly to shaping the cooperative's governance model. They allowed for the collective elaboration of what Hatchuel et al. (2017) describe as a generative framework: not limited to selecting between predefined options but enabling the emergence of new alternatives through dialogue, experimentation, and shared reflection.

In this sense, governance was not a separate, formalized structure but a process embedded in the project's everyday life. It took place in these in-between moments where method, culture, and power dynamics were continuously negotiated and adjusted. This central role of inter-sessions as governance spaces also shaped how the future cooperative was prefigured.

Rather than designing governance as a separate, predefined architecture, the process became an arena for testing, negotiating, and gradually building the cooperative's operating principles and shared responsibilities.
In the next section, we explore how this prefiguration phase opened a space for experimentation, not only on what the cooperative could do but also on how it could work as a collective system.

4. Prefigure the cooperative: a generative form of collective action.

4.1 Facilitating a collective governance

Our analysis indicates that the governance of the future cooperative cannot be confined to transmitting information or serving a coordinating role. Like the inter-sessions that have shaped our overall approach, it must foster collective reflection, dialogue, and co-construction aimed at innovation and creating new forms of organization and action.
In French local authorities, the Steering Committee (COPIL) defines strategic orientations and validates key decisions, while the Technical Committee (COTECH) focuses on the project's operational implementation. These bodies aim to promote the 'public interest' (Duvernoy et al., 2014). However, as Hatchuel et al. (2017) point out, these traditional institutional forms are insufficient given contemporary innovation dynamics. Indeed, they depend on classic decision-making models that emphasize selecting pre-existing alternatives, whereas our context requires the ability to generate novel solutions. Hatchuel et al. (2017) suggest viewing the organization as a generative metabolism, meaning an evolving system capable of fostering collective creation dynamics, generating new forms of enterprises, and structuring supportive collectives.
These co-design spaces, known as 'arenas of debate' (Mollon, 2019), transcend the role of simple exchange venues; they are environments where differing opinions can be expressed, confronted, and transformed. As Darras (2017) highlights, a co-design mediator is essential in facilitating interactions and guiding group dynamics while translating various areas of expertise and managing conflicts using artifacts. These artifacts, designed to structure discussions, enable the identification of tensions and disagreements (Mollon, 2019). According to Darras (2017), the mediator's role goes beyond fostering a harmonious working environment; they must also prevent the re-emergence of implicit hierarchies to ensure a genuinely horizontal and democratic process (p. 150).
In this context, our study shows that the pilot team can no longer confine itself to the external sponsor and decision-maker role. It becomes a fully committed player in the collaborative process, adopting a facilitative stance that allows it to exploit available skills and influence mental models to support organizational change (Bijl-Brouwer & Malcom, 2020).
Therefore, in addition to establishing collaborative processes, governance must create a framework that ensures sustainable integration. A strong culture of co-design, supported by mediation and facilitation practices, is essential for embedding these collaborative

spaces into the cooperative's operations and ensuring their longevity. These practices should be integrated from the governance structuring phase onward to encourage collective learning and social innovation, making them a key lever for organizational development.

4.2 A collaborative learning environment.

Co-design should not be viewed solely as a methodological exercise. It must be integrated into the practical realities of the organization under development to serve as a genuine lever for organizational transformation grounded in a collective vision. (Manzini, 2016; Reunkrilerk, 2022).
The pre-configuration phase enables to anticipate how the future cooperative will be organized and operated while conceptualizing areas for interaction and coordination. The external design team must gradually share its expertise with stakeholders to enhance their autonomy and ensure the sustainability of the co-design process. Analysis of the interviews shows that the pilot team believes it has progressively developed its skills, transitioning from a traditional consultative approach to an experimental co-construction methodology. To ensure the sustainability of initiatives beyond the experimental phase, it is essential to open the inter-sessions to new stakeholders so they can participate in co-design at a more strategic level within the cooperative.
This openness is essential for initiating a gradual transformation and fostering a collaborative learning culture. The pre-configuration phase of the future cooperative involves stakeholders in co-producing the cooperative's 'instructions for use.' Engaging specific stakeholders in co-designing the instructions will help solidify the organizational culture toward greater collaboration and mutual learning (Chamberlain & Partridge, 2017; Coblence & Pallez, 2015; Poudray et al., 2019).
Identifying key skills is essential to the smooth running of these extended inter-sessions. As Dubois (2015, p. 165) argues, ensuring the sustainability of co-design systems requires the design team to adapt to the rotation of key players. Manzini (2015, p. 154) emphasizes that while everyone possesses an inherent ability to design and collaborate, these skills must be nurtured and maintained to prevent erosion. The collaborative transfer of knowledge depends on employing tools, practices, and expertise tailored to local dynamics and easily transferable.

This would allow a new committee to promote the co-design culture strategically. The co-design sessions between the pilot and design teams would shape this committee, serving as a learning space that gradually includes certain participants. This would ensure the sustainability of the approach for projects lacking a dedicated innovation structure.
These inter-sessions, open to various stakeholders, encourage tolerance, openness, and the development of learning capabilities while promoting a design culture. (Manzini, 2015, p. 161). However, the design team must ensure that the tools it implements reflect the whole structure and guarantee this openness.

4.3 The "usage guidelines" as an intermediary and boundary object

Reunkrilerk (2022) highlights organizations' challenges when adopting a co-design methodology without dedicated mediation. This process necessitates gradual adjustments to tailor mediation to organizational dynamics, relying on intermediary and boundary objects (Star & Griesemer, 1989) that structure interactions and promote the evolution of organizational cultures. These objects are not merely tools for conveying information but are dynamic artifacts that foster experimentation, negotiation, and co-

design adaptation. They play a crucial role in adopting new practices by structuring communication and decision-making (Reunkrilerk, 2022).
In this context, the cooperative's usage guidelines —the main deliverable of the approach—serve as a central tool: it formalizes a collective vision while stabilizing collaborative practices. Vinck (2012) identifies two significant effects of intermediate objects: a structuring effect that enhances participant coordination and an alignment effect that solidifies shared references. Jeantet (1998) also emphasizes their role as a catalyst for cooperation, offering a common framework for adapting collective practices. Reunkrilerk (2022) illustrates that these objects act as mediators, reshaping relationships between players and facilitating the adoption of new organizational practices. They can evolve into boundary objects, encouraging the standardization of practices while preserving the flexibility needed to adapt them.
In this way, the usage guidelines are not just an operational manual; they transform into a platform for dialogue where stakeholders can modify their practices and ensure alignment between the project's goals and its execution. For a boundary object to be effective, it must be stable and adaptable (Mark et al., 2007): it should be structured enough to ensure consistency while still being flexible to accommodate organizational dynamics. A rigid frame of reference may stifle innovation and reduce co-design to a standardized approach detached from local realities (Reunkrilerk, 2022).
From this perspective, Reunkrilerk (2022) and Catoir-Brisson (2022) highlight that mediation through design relies on tools and artifacts that improve communication and the adoption of new practices. This method reduces tensions, fosters participation, and integrates co-design into organizational structures over the long term.

Finally, the co-design of the instructions for use, acting as a strategic lever, which will take place during the last two workshops in the process and with the enlarged co-design committee, will reinforce co-design mediation and the creation of this generative collective governance.

4.4 Toward a model of generative co-governance

Our findings suggest that inter-sessions can evolve from logistical preparation spaces into strategic governance mechanisms. Initially framed as support moments, used to align agendas, distribute tasks, and report progress, they gradually transformed into arenas where the rules of engagement were negotiated, strategic choices were discussed, and responsibilities were collectively adjusted.
This evolution prefigures a shift toward generative co-governance: a flexible, evolving model in which governance is not predefined but emerges through collaborative practice. Unlike traditional structures that validate pre-set options, these inter-sessions allowed stakeholders to co-create new possibilities in real time, adapting decisions to the evolving context and needs.
In this model, governance is not external to the co-design process; it is one of its most active outcomes. These inter-sessions become critical infrastructures for institutional learning: they synchronize different timeframes, clarify roles, and progressively distribute authority. Co-design, in this sense, becomes not just a method but a way of governing, a logic of action embedded in organizational culture.
Through the co-production of boundary objects like usage guidelines and shared facilitation practices, inter-sessions help stabilize the emerging cooperative's internal governance. They institutionalize collective learning by embedding reflexivity and co-responsibility in daily operations. This illustrates how informal, iterative design practices reshape formal structures and explains why we argue that the future of public governance may depend significantly on what happens between workshops.

5.Conclusion

Our research highlights the importance of inter-sessions in co-design dynamics. Although this co-design project does not rely on physical infrastructure like an innovation laboratory, the pilot and design teams have created intermediate spaces to facilitate coordination and alignment. These spaces are crucial for shaping collaboration and reinforcing trust and cohesion among the teams, and, by extension, all participants involved.
However, grounded in an existing framework and a strong professional culture, these inter-sessions have faced resistance, making it challenging to shift perspectives. Our study also underscores the transformative potential of inter-sessions in co-design processes. Initially serving as logistical coordination points, these inter-sessions evolved into strategic arenas where roles were negotiated, trust was cultivated, and collective ownership was established. This progression illustrates the emergence of generative co-governance—a dynamic model where governance structures are not merely predefined but co-created through ongoing collaborative practices.
Inter-sessions have become pivotal in institutionalizing co-design within organizational frameworks by facilitating continuous dialogue and mutual learning. They serve as boundary mechanisms, bridging diverse professional cultures and synchronizing varying timelines and ambitions. This evolution represents a shift from viewing co-design as a project-specific tool to recognizing it as an embedded logic of action within institutional operations. For public organizations seeking sustainable transformation, acknowledging and nurturing these often-overlooked interstitial spaces is crucial. Inter-sessions are not just ancillary components of the design process; they are the arenas where institutions learn to govern collectively, adaptively, and innovatively. As such, co-design transcends the creation of services, redefining the processes through which decisions are made and governance is enacted.

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Invitation to Serious Play: R/Evolutionary Thinking Cards – Creating Space for Emergence and New Ways of Being

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ABSTRACT | The *Invitation to Serious Play* workshop reimagines sustainable, collaborative, and inclusive innovation practices through playful exploration. The session aims to reflect on and disrupt conventional innovation practices by applying the principles of Serious Play to encourage reflective creative, and systemic thinking. Participants will explore how innovators can prioritize sustainability, systems thinking, emergent thinking, while moving away from traditional, linear problem-solving approaches.

By engaging in interactive exercises using the *R|Evolutionary Thoughts* card deck, participants will reflect on their positionality, identify how their perspectives shape their work, and consider how these new perspectives can impact their innovation work. The activities promote ethical considerations and multi-sensory engagement, fostering an environment where diverse viewpoints are valued. This approach helps participants question normative assumptions and generate novel insights for tackling complex, systemic challenges.

The session encourages collective efforts toward rethinking innovation practices, emphasizing the importance of considering various scales, contexts, and viewpoints in creating sustainable systems. The goal is to engage participants in design-led, tactile exercises that prompt reflection on their positionality and facilitate the creation of artifacts that spark conversations and foster critical thinking for more inclusive innovation. The session is designed for 15–25 participants.

KEYWORDS | SUSTAINABILITY, EMERGENT THINKING, SERIOUS PLAY, SYSTEMIC DESIGN, INNOVATION

1. Introduction

In recent years, critiques of unsustainable modern practices have gained mainstream attention. From exploitative labor models and personal health negligence to unsustainable economic structures and exploitative environmental policies, contemporary systems prioritize machine-like efficiency, growth, and immediate profit at the expense of long-term viability (Yunkaporta, 2021). The focus on maximizing productivity often disregards the cyclical, fluid, and adaptive nature of living systems, favoring a standardized and linear approach that undermines both human and ecological well-being. This artificial divide between nature and culture falsely assumes that humans can rationally and systematically control all processes, reinforcing unsustainable approaches to innovation and problem-solving (Rees, 2020).

To move toward sustainability, we must redefine it beyond environmental concerns to include all living systems—human and non-human. This shift requires an epistemological change: rather than seeking to manage or control systems, we must learn from natural ecosystems and incorporate their fluid, adaptive, and emergent properties into our ways of thinking and working (brown, 2017).

Design-led research tools can facilitate this shift by encouraging new ways of seeing and questioning problem spaces. The prompts and exercises used in this workshop form a repository of activities that integrate Serious Play into critical innovation processes. This collection encourages alternative ideation approaches that prioritize inclusivity, ethics, and systemic thinking. By leveraging a format familiar in creative, educational, and consultancy settings—cards—this tool bridges traditional innovation methods with more radical, exploratory ways of thinking.

This workshop introduces Serious Play as a framework that disrupts conventional innovation methods, fostering systemic, holistic, and emergent approaches to creativity and ideation.

2. Serious Play as a Framework for Emergent Thinking

In biological systems, play is a crucial yet seemingly inconsequential activity that fosters learning and adaptation. Applying this concept to innovation—traditionally viewed as structured, goal-driven, and logical—offers a transformative approach to problem-solving. Serious Play transcends binary thinking, blending intuition with logic, structure with fluidity, and creativity with analysis. By removing traditional stakes and productivity pressures, participants can explore unconventional ideas and perspectives without the constraints of immediate feasibility.

Serious Play combines the freedom of uninhibited exploration with a reflective dimension that acknowledges the potential for valuable and viable solutions to emerge from seemingly unstructured activities. It challenges the assumption that innovation follows a linear trajectory, instead recognizing that breakthroughs often arise from unexpected connections beyond predefined project objectives.

Serious Play creates a space for emergence, where participants engage in hands-on, embodied exercises that challenge ingrained thought patterns. This approach is not about producing immediate, tangible outputs but about unlearning habitual ways of thinking and making room for novel insights.

3. Workshop Structure

This interactive engagement invites participants to engage with a custom-designed card deck, *R|Evolutionary Thoughts*. The deck serves as a prompt-based tool for reflection, exploration,

and creative engagement. The workshop follows a structured yet open-ended format:

1. **Introduction & Distribution of Cards (5 min)**: Participants receive a deck of cards containing prompts designed to disrupt conventional thinking and encourage embodied engagement.

2. **Individual & Group Reflection (10 min)**: Participants reflect on and respond to prompts through various mediums, including sketching, writing, and creating artifacts. The prompts challenge normative assumptions about human positionality, innovation, and systemic interdependencies.

3. **Review & Exchange (10 min)**: Participants share their responses, facilitating peer-to-peer learning and the emergence of new perspectives. Reviewing others' outputs allows for unexpected connections and insights.

4. **Facilitated Discussion & Reflection (5 min)**: The workshop concludes with a structured discussion on key takeaways, emphasizing the role of unlearning and emergent thinking in reshaping innovation practices.

Conclusion
By engaging in Serious Play, participants will experience the value of exploratory, non-judgmental creativity as a means of challenging dominant innovation paradigms. This workshop provides a novel tool for fostering fresh perspectives in innovation spaces, encouraging participants to rethink what it means to learn, unlearn, and create. Ultimately, the goal is to expand the boundaries of what is considered possible, realistic, and rational in innovation discourse—paving the way for more systemic, holistic, and sustainable approaches.

The workshop addresses power dynamics in innovation by encouraging participants to reflect on their positionality, challenge their established thinking patterns, and engage with diverse perspectives to foster more inclusive and equitable approaches to problem-solving.

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Gabriela Karolak is a service and strategy designer, researcher, and educator. She co-creates equitable healthcare and civic systems, drawing on ethnographic methods to center lived experience. Her work explores futures, co-design, and the evolving role of designers as facilitators.

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Landscape Design for Urban Residual Spaces from a Humanistic Care Perspective --- Landscape Design of Conca dell'Incoronata

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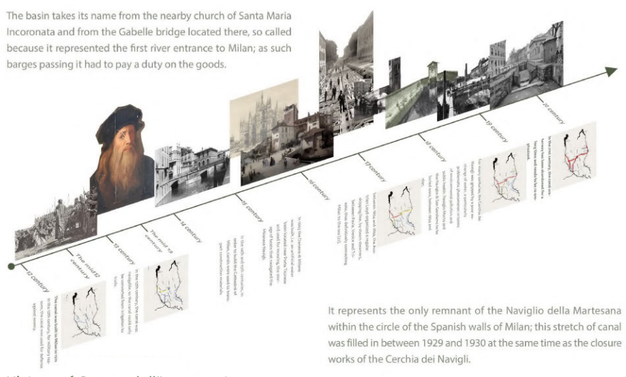
Abstract

This study explores the theory and practice of urban residual space landscape design from the perspective of humanistic care. By investigating the development of humanistic care theory and its application cases in landscape design, we reveal its spiritual essence and find ways to improve the landscape quality of residual urban spaces. Subsequently, specific solutions are proposed based on the different types and spatial characteristics of the residual urban space and considering the diverse needs of different user groups. This study provides a new perspective for effectively improving urban space utilization and creating a people-centered diversified urban landscape.

The design case is located in Conca dell'Incornata, which mainly consists of urban green spaces and canal waterway remnants. The design first considers the diverse needs of different user groups and their physical and mental needs at different times. The design takes into account the spatial characteristics of different parts of the site and the existing landscape resources, using elements that are easy to assemble and disassemble and are environmentally friendly. Through public participation, activity implantation, community platform construction, community gardening, flexible facility design, and sensory design, the functions and quality of the existing site will be improved.

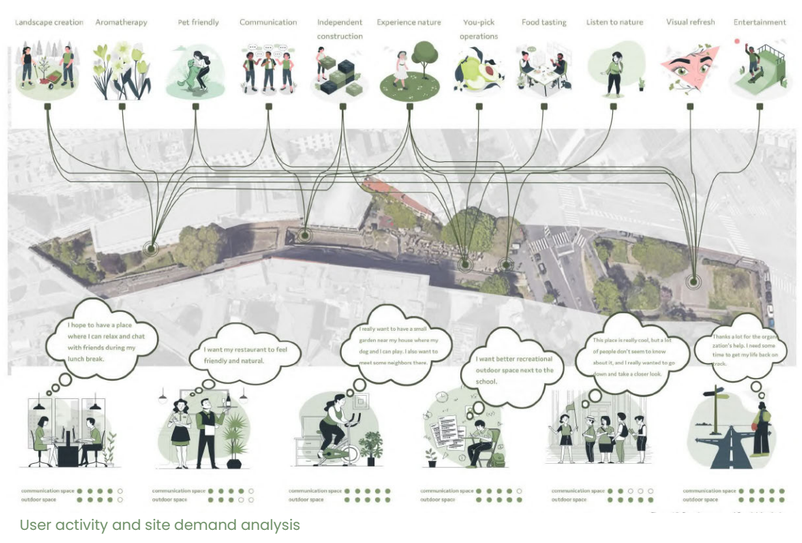
Background and Research

Milan, as an industrial and commercial center, has built a large number of public facilities to meet the needs of urban development. However, with changes in production methods and lifestyles, many of these facilities were abandoned. Furthermore, due to incomplete laws and regulations on urban spatial planning, many urban residual spaces remain underutilized during the city's rapid development.
Although Milan has many urban residual spaces, there are still groups and communities whose needs for urban space are neglected. Many spaces in the city do not effectively serve the needs of different groups, resulting in low efficiency of urban space utilization. The design aims to enhance attention to the material and spiritual needs of different users in different periods and encourage their participation in the construction and maintenance of the urban residual space landscape. This will ensure that the remaining urban space better meets the diverse needs of its users and reduces the waste of usable urban space.
In addition, the design explores sensory design, starting from a micro perspective and using landscape to awaken people's visual, auditory, taste, touch and smell systems, in order to bring a bit of fun to people's busy lives and make people aware that every tiny individual is cared for, and the city is not a cold machine.



History of Conca dell'Incoronata

Methodology and Tools



User activity and site demand analysis

PHASE 1

Observational Method
For on-site research, a one-week field observation was conducted to record visitor demographics, activity locations, and primary activities. Additionally, potential security and sanitation issues were identified, along with interactions between different user groups and any conflicts in site usage. In the online research component, social media platforms such as Instagram were analyzed to gather user impressions and notable activities related to the site from diverse demographic groups.

PHASE 2

Survey Method
Using a combination of paper and online questionnaires, the survey investigated the demographics of visitors to the "Conca dell'Incoronata," including age, gender, and identity. It quantified the proportion of different user groups, mapped their frequently visited spaces within the site, and identified the activities they engaged in. Furthermore, it assessed their needs and preferences for spatial improvements.

PHASE 3

Interview Method
Based on the demographic distribution obtained from the survey, in-depth interviews were conducted with users from different backgrounds on-site. These interviews provided deeper insights into their experiences, spatial perceptions, and specific needs. After synthesizing their feedback and suggestions, an initial design proposal was developed and presented to site users for further refinement based on their input.

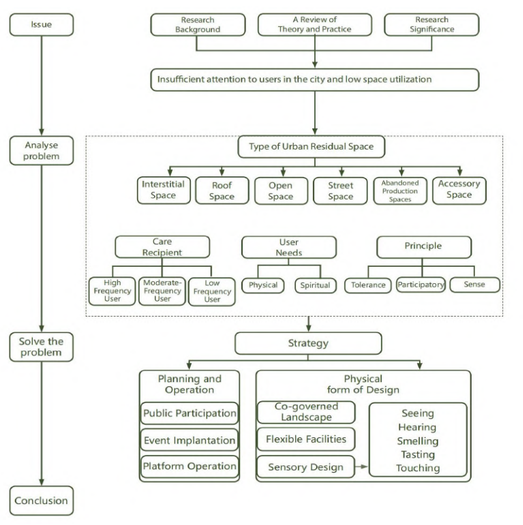
CiteSpace
Literature review tool

SurveyMonkey
Questionnaire tool

Google Trends
User interest research tool

Instagram
Venue event research tool

Research Process



Research Strategy

Planning Aspect

Public Participation
Preliminary Research
Design Interaction
Feedback Integration
Construction and Implementation
Post-maintenance

Event Implantation
Spatial Classification
Single-point & Node & Area
Public Holiday Pop-up Event
spatial construction activities

Platform Operation
Social Platforms & Apps
Decision-making Stage
Shared Resource Platform
Contact Sharing Platform
Real-time Monitoring Platform

Physical Aspect

Co-governed Landscape
Claim area
Adopt plants
Plant knowledge popularization
Fruit sharing

Flexible Facilities
Configurable Facilities
Playful Facilities
flexible urban space

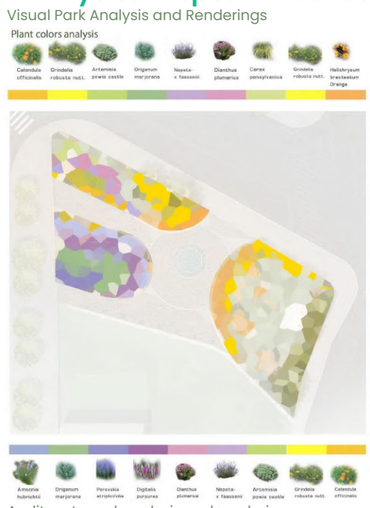
Sensory Landscape
Seeing
Hearing
Tasting
Touching
Smelling

Drawing on theories of residual space and Maslow's hierarchy of needs, the site optimization strategy is formulated from both psychological and material perspectives. Psychologically, the strategy enhances users' sense of belonging through public participation in landscape design, event integration, and the development of a community platform. Materially, it strengthens public engagement in environmental creation through co-governed landscapes, sensory landscapes, and flexible, adaptable facilities.

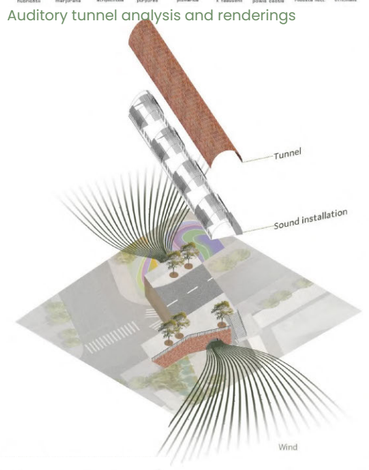
Expected Results

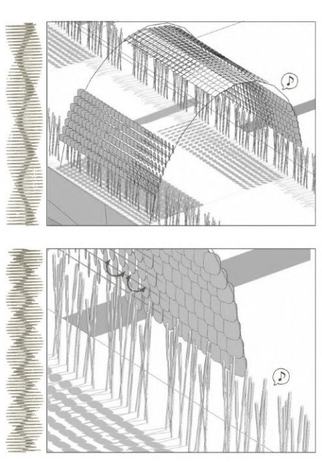
03 Physical Aspect---Sensory Landscape

Visual Park Analysis and Renderings

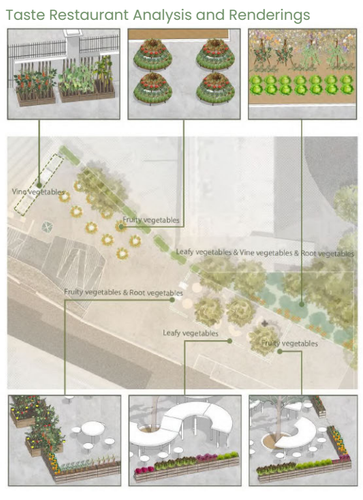


Auditory tunnel analysis and renderings





Taste Restaurant Analysis and Renderings



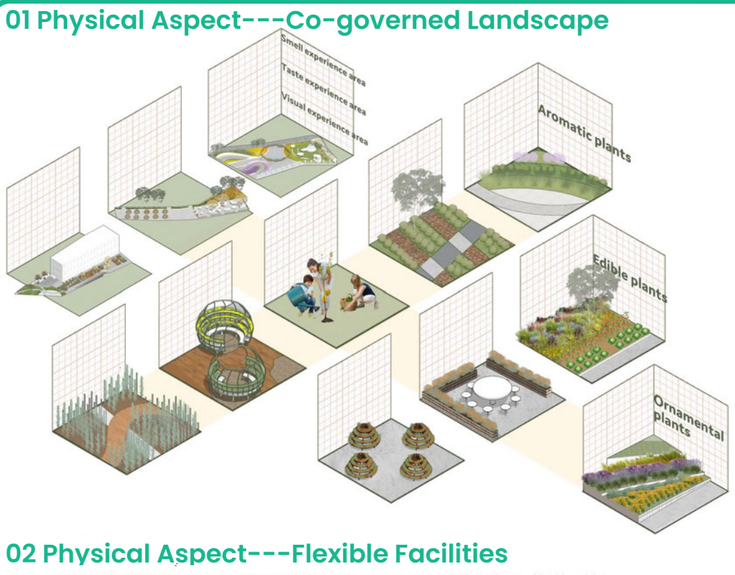
The study explores various design strategies within the physical environment to encourage community engagement with underutilized spaces. These strategies are categorized into three key components: co-governed landscapes, flexible facilities, and sensory landscapes.

The co-governed landscape consists of aromatic, edible, and ornamental plant areas, where plants can be adopted and managed by community residents and citizens. A dedicated social platform allows users to share and coordinate planting activities.

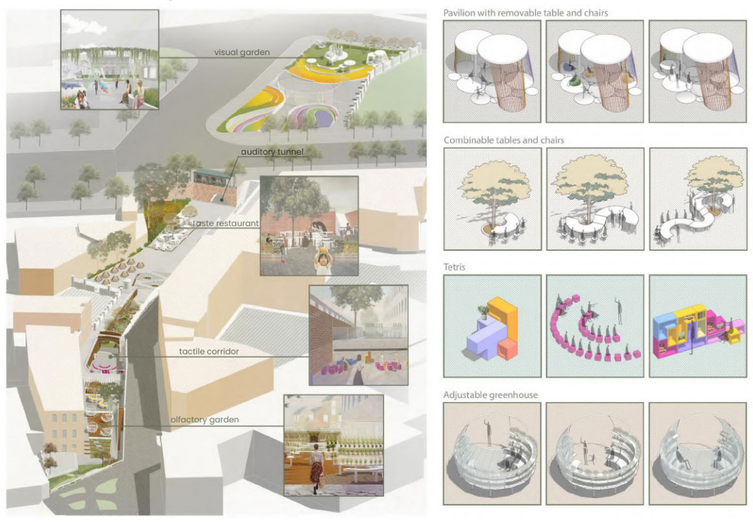
The flexible facilities include adjustable greenhouses in aromatic planting areas, modular tables and chairs in the taste restaurant, and combinable cubic furniture in the tactile corridor. These elements empower users to actively shape the space.

The sensory landscape enhances spatial perception through different sensory experiences: plant colors in the visual garden, wind speed in the auditory tunnel, plant flavors in the taste restaurant, natural textures in the tactile corridor, and plant fragrances in the olfactory garden. This approach not only stimulates the senses but also fosters a therapeutic and immersive spatial experience.

01 Physical Aspect---Co-governed Landscape



02 Physical Aspect---Flexible Facilities



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Ecological Activation in Participatory Temporary Urbanism: values and challenges from an Urban Regeneration case in Shanghai

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ABSTRACT | Urban regeneration is increasingly framed as a process of social renewal. Yet, gaps persist in translating policy frameworks into grassroots action. Grounded in more-than-human design theory and temporary urbanism, and drawing on an international collaboration project across seven pilot sites in Europe and China (2020–2025), the paper analyses how participatory temporary urbanism—a methodology combining community co-design and temporary use interventions—bridges this gap by fostering ecological urban regeneration in diverse metropolitan areas.
In the study, the importance of repurposing temporary spaces through meanwhile-use activation has been explored as an approach intrinsically linked to regenerative cities. The project scope emphasises the potential for transforming underutilised urban areas into vibrant community hubs through mission-oriented activation. The project developed more than 100 temporary-use practices, aiming for a range of missions, from circular practices and new capacities and skills to local identity and heritage.
The paper describes the shared co-benefit that society and the environment can draw from more-than-human approaches to urban regeneration, with a focus on Shanghai's

Xinhua pilot.
Through mixed methods, we explain how temporary uses—from biodiversity mapping to zero-waste hubs—catalyse long-term stewardship. The Shanghai case reveals a hybrid governance model (university-community partnerships) that enabled rapid prototyping but relied on informal agreements.
The paper presents a typology of ecological temporary uses that serves as a planning tool for communities engaged in participatory regeneration. It highlights innovative approaches to urban regeneration and emphasises the critical role of community engagement in fostering adaptable and inclusive urban environments. By centring Shanghai's Zero-Waste Action hub as a crucial case, we highlight how temporary urbanism can transform declining spaces into thriving socio-ecological systems, offering a replicable framework for cities navigating rapid urbanisation and ecological crises.

KEYWORDS | Urban ecology, participatory urbanism, urban regeneration, prototyping, ecological activation

1. Introduction: Urban regeneration and temporary uses

1.1 Participatory Urbanism Project Framework

Urban regeneration is a multifaceted process generally aimed at revitalising declining urban areas. It may or may not involve physical redevelopment, but it is increasingly connected to social renewal. As pointed out by the UN-Habitat report (UN-Habitat, 2021), *"Urban regeneration does not only transform the physical environment but is a new paradigm for urban life in which the principles of social inclusion, resilience, compactness, community participation, and socio-economic prosperity are the starting point for co-creating the city"*.
Under this premises, the paper discusses practices of open urban regeneration across European and Chinese cities in the framework of an international collaboration project (T-Factor "Unleashing future-facing urban hubs through culture and creativity-led strategies of transformative time", 2020-2025*)*, particularly highlighting how the model of participatory regeneration envisioned through the international collaboration has been applied to the Shanghai pilot case, and how it has generated forms of community participation and organisational model supportive of regenerative territorial development on the long-term timescale and in multi-stakeholders scenario (Wu et alii, 2024).
Based on Bishop & Williams (2012) notion of "temporary urbanism", the project puts forward the definition of "participatory temporary urbanism": urban regeneration can - and possibly it must - be a creative and collaborative process of shaping and crafting places during urban transition and redevelopment phases, as a laboratory for the future of cities and, consequently, of the Planet (Arniani et alii, 2024). This definition envisions regeneration processes sustained through community involvement and participatory practices, utilising tactical tools (such as co-design workshops and participatory actions) and strategic instruments (including the long-term activation of community planning and the stewardship of green spaces and ecological projects).
The project has developed an urban regeneration methodology and paradigm that deconstructs the rigid and deterministic approaches that have often characterised many urban renewals across Europe and beyond, generally based on heavy infrastructure intervention and top-down management; instead, it suggests that leveraging temporary uses offers a viable alternative to city-making at times of uncertainty and rapid change. Addressing challenges such as social and cultural deprivation, loss of green and public spaces, economic downturn, and spatial segregation, temporary interventions often address the problems that urban regeneration is tasked with solving, accelerating the pace of change and creating co-benefits. Temporary uses are context-dependent strategies that integrate universal principles with local realities to achieve comprehensive outcomes (Martelloni et al., 2023).
For four years, the project developed in six pilot areas across European cities *(*Milan, Amsterdam, Kaunas, Bilbao, Lisbon, London*)*. Parallel research and innovation efforts have also been

undertaken in three districts in Shanghai (Xinhua Community Design Centre, NICE 2035 neighbourhood and MeetU Lab). In their contextual and local differences, all the pilots have experimented with temporary uses to embrace long-term thinking and develop agile strategies for uncertain futures. The project adopted an action research approach to iteratively test participatory urbanism across the seven pilot sites. The methodology aligns with the project's goal of bridging academic research and community co-design. All the cities developed programs of participatory interventions, and they work independently and in synergy through many distributed, connected experiments around six thematic "regeneration missions", which articulate different axes of urban sustainability and development.

Figure 1. Six thematic missions of urban regeneration of the project

1.2 Ecological Activation of Participatory Communities

Among the hundreds of cases and interventions for temporary uses developed in the project, the paper focuses on practices in which participatory strategies are applied to the urban ecology framework and the potential of regenerative discourse for the city (https://hub.t-factor.eu/toolbox-per-themes/1/).
In the project, the regeneration mission has been defined as *"Greening, biodiversity and urban wilderness - Cities as living ecosystems",* aiming to explore ways for temporary uses to cultivate new understandings of humans' entanglements with urban nature and foster more collaborative and respectful relationships that allow people and nature to thrive together. This mission directly addresses the gap between the general awareness of the profound ecological crisis society is facing and the uneven sense of urgency to act in response to it. Cities become the testbeds for the shift towards an ecological society, both in their infrastructures and their inhabitants' mindsets (Douglas, 2018). This paradigm shift is compelling globally for European cities and their growing populations, as well as megacities scattered throughout the planet. Greening cities is related to their footprints and the impact on climate goals. Still, it also contributes to increasing ecological knowledge and raising the universal concept of "ecological citizenship" within the human scope and towards the more-than-human (Akama, 2020). Across Europe and China, the European Green Deal, the UN Convention on Biodiversity (UN, 2022), the World Bank (TWB Policy Brief, 2021) and the construction of Ecological Civilisation (Gare, 2021; Geall, 2018) represent comprehensive policies to enhance urban nature, biodiversity, and ecological affordances, from implementing green infrastructure strategies to biodiversity conservation, and how citizens can be involved in environmental stewardship.
Whilst these global-scale policy frameworks promote ecological transformation of society, gaps persist in grassroots implementation. Urban ecology scholars (Hanson, 2019 and Haskell, 2021) highlight the risk of "greenwashing" in regeneration, and they advocate for just sustainability (Gu

et al., 2021) that links ecological health to social equality and direct participation.

2. Urban Regeneration Through Ecological Participation as a Research Methodology

2.1 Ecology-driven temporary uses in urban regeneration

Having established the project's theoretical basis (Paragraph 1), we now analyse its ecological implementation (Paragraph 2), focusing on Shanghai as a critical case.
Practices of urban greening, rewilding, and engaging with biodiversity and ecological interventions are increasingly documented and demonstrate co-benefits for urban regeneration regarding the enduring quality of life for people and other organisms and the transformation of urban planning strategies towards more-than-human concerns (Zohar et al. 2014; Gatto, 2019). Ecologically-driven micro-regeneration contributes to understanding and restoring natural habitats and allows citizens to look at the city beyond the human scale and as an all-being ecosystem. At the implementation level, this process presents challenges: the competing demands for limited urban space are not exempt from pressure from commercial development over green infrastructure. Maintenance costs of green projects are significant and still rely mainly on inadequate public funding, which can lead to gradual degradation over time. Moreover, relational challenges are present: engaging and mobilising stakeholders, including local communities and administration, can prove difficult due to conflicting interests and priorities (Cipriani et al., 2024).
Ecological urban regeneration entails a cultural shift that involves an enhanced—if not radically new—perception of flora and fauna and their role in citizens' everyday lives and urban dynamics. Therefore, micro-regeneration with an "ecological mission" must incorporate intangible interventions, such as raising environmental awareness at all the stakeholders' levels, fostering frequent and deeper connections to nature, cultivating an aesthetic appreciation of the natural world among citizens, and integrating non-human elements into the local community (Tarsitano et al. 2021; Edwards et al. 2022).
This may involve engaging citizens with nature through collaborative forms of biodiversity mapping and monitoring, hands-on workshops, immersive observations and explorations, artistic interventions, educational programs, nature festivals and other types of public events - laying the ground for a culture that values and champions deeper connections and collaborative human-nature relationships. The project has experimented with the role of temporary uses as a strategy of micro-regeneration and an opportunity for capability-building among citizens to expand the notion of place encompassing non-human elements and create communities of practice and communities of places. As Zhu (2023) highlights, micro-regeneration impacts how people generally understand the notion of "public space" in China and beyond.
Across the seven cities involved in the project, more than 100 micro-regeneration projects have been experimented with, including forest schools, Wild Spot and ecological placemaking, nature-inspired public furniture, landscape festivals and public activities, DIY construction of pollinators' gardens, insect hotel and nature observation station, foraging and wild herbs cooking, etc. Drawing on the catalogue of implemented projects from the pilot cities, we created a matrix (Table 1) to define areas of intervention for temporary uses under the theme of ecological urban regeneration, serving as an interpretative and planning tool.

Table 1. Typology of Ecological Temporary Uses: Themes, Objectives, and Case Examples. Derived from cross-case analysis of 7 pilot sites (2020–2025).

Biodiversity mapping & monitoring	Developing creative and engaging forms for exploring and mapping biodiversity in urban regeneration areas, fostering the 'art of noticing' and appreciation of natural resources, promoting citizen science approaches, and creating do-it-yourself artefacts
Traditional green	Creating new green spaces or preserving/restoring existing ones, such as public

spaces and urban agriculture	gardens, green pockets, and vegetable gardens. These interventions can have environmental benefits (aesthetic and quality of the space) and social benefits (recreational spaces, relaxation, social interaction, and opportunities for increased nature-connectedness)
Urban wilderness areas	Establishing designated pockets of urban wilderness that exhibit characteristics of landscapes where human intervention is minimal or absent
Well-being hotspots	Testing spatial artefacts and place designs that promote well-being for individuals and other living organisms, employing nature-based solutions and exploring soundscapes and bio-acoustic environments
Hands-on workshops, Nature's festivals and events	Organising workshops, seminars, and other learning sessions on sustainability topics, such as environmental conservation, urban gardening, and green building practices, to equip individuals and communities with knowledge and tools for endorsing greening and biodiversity objectives; developing events that celebrate nature in the city and foster the ecological scale of urban environments
Community engagement and stewardship	Involving residents, local communities, and stakeholders in experimental activities of planning, development, maintenance, and governance of green spaces and ecological knowledge, fostering ownership, environmental stewardship, and collaborative care of green assets and infrastructure.
Ecological intervention in urban systems	Developing a systemic and relational notion of ecology and environment, in which not only the "planted" and "curated" green is taken into account, but also developing knowledge and skills that foster the appreciation of ecology as a web of life; composting, leave-no-trace, upcycling, reduce workshop and education.

The matrix suggests implementation areas where each city and context adapts to local stakeholders and partnership networks, and modulates according to specific contextual participation dynamics. Through international research, we can see that "participatory communities" differ widely in identity, forms of relationships, ways to build shared goals, and ways to determine everyday actions. Whilst the drive towards ecological forms of society may be universal, how regenerative and restorative territorial approaches are implemented is very contextual and strongly depends on the conditions of the regeneration project.
In some cities (Milan, Kaunas, Amsterdam), urban regeneration plans have created the conditions for ecological development, for instance, when they occur in metropolitan areas with a high percentage of green space or with specific biodiversity characteristics suitable for participatory conservation, maintenance, and engagement interventions. Another condition would be the existence of a "local stakeholder" already active in ecological matters, which could be the catalyst for further participatory initiatives. In these cases, the communities can express the intention to intervene in urban ecology subjects as the trigger of their participation and actions. In other cases, the ecological drive does not pre-exist in the participatory community (Shanghai). Nevertheless, the community has been very active and widely involved in the regeneration plan from the beginning of the project, through micro-scale participation in the process and in the governance of the space. The results are frequent, varied and multifaceted collaborative projects. This process stimulated the self-organisation of the mission of regeneration, thereby developing an emergent interest in ecological and sustainability topics, whether as a drive for community or space construction. Therefore, the territorial co-benefit between people and nature is relevant as an outcome of the regeneration practices.
While all sites embraced temporary uses for ecological regeneration, implementation diverged due to cultural, governance, and resource factors. These differences nevertheless position the Shanghai case as a unique outcome, composed not only of a series of regeneration activities but also of a broader community development framework.
Such uniqueness is grounded on Wang's (2021) insights regarding the balance of top-down and bottom-up approaches and structured according to the following factors:

A. Governance Models

a. Shanghai's hybrid approach (university + social enterprise) enabled rapid prototyping but relied on informal agreements.

B. Scale dimension
   a. Ecological intervention is a comprehensive initiative involving multiple communities and sub-projects, yet a fragmented resource system supports it.

C. Temporal Dimensions
   a. Articulating short-term, prompt, and continuous interventions creates a complex timeline that is sometimes hard to recognise as continuous.

2.2 Temporary uses and regeneration in the Shanghai pilot project

The Shanghai pilot is located in Xinhua CDC, a shared community space operated for over three years by the social organisation Big Fish through community activities' support and design (Figure 2). The space is managed under an agreement with the landlord and the local government, which retains ownership of the building while leaving the operation of the space to the organisation, in collaboration with universities, local stakeholders, and business partners. The space has a rich, diverse spatial layout and project operation functions. It was transformed from an abandoned building into a structured space with fixed functions and numerous idle spaces for temporary use.

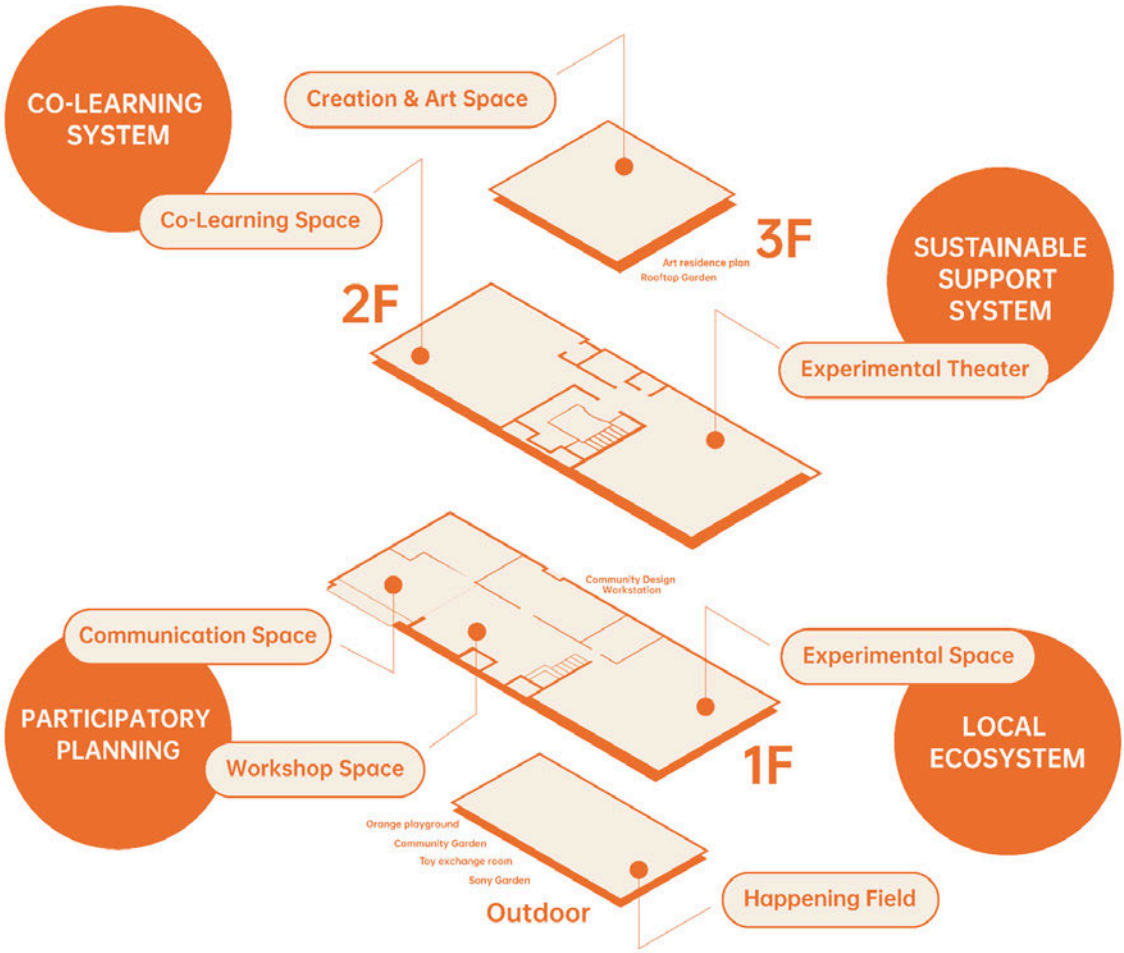

Figure 2. The diagram illustrates the spatial layout of Xinhua CDC, showing the different participatory interventions in regeneration. The space arrangement outlines the condition of community participation based on regular daily activities.

Whilst Big Fish takes charge of the space's general management, the daily operations are overseen directly by community members and promoters, thereby stimulating the space's vitality. A significant role of the social enterprise is to carry out community empowerment projects, organise professional training, share experiences, and take participatory actions to

enhance community residents' ability and awareness to participate in community construction, thereby injecting continuous impetus into the community's sustainable development.
The space's configuration presents ideal characteristics for defining temporary uses, and collaboration with the university has allowed the development of initiatives dedicated explicitly to citizens' ecological participation. This collaboration between the university, social enterprise, and public reflects the intellectual debate of "implementing Ecological Civilisation strategies" (Marinelli, 2018). It addresses the requirements of the Shanghai government's environmental master plan (SUPRI, 2021). Drawing from the categories of Table 1, the paper describes in detail the Shanghai pilot experiment; whilst the EU project concluded in 2024, the China pilot is still funded and running, providing the possibility of multi-temporal evaluation of the participatory intervention (Zohar et al. 2023), from the prompt uses to long-term implementation.
Different stakeholders have jointly initiated many ecological activities that have different temporal dimensions, not in "durability" and "length" but in the capacity to move from tactical intervention to strategic planning.
According to their temporal dimension, we classified the activities (Figure 3) into four kinds:

1. Periodic activities hosted by stakeholders during different festivals, such as Earth Day (prompt)
2. design courses that bring university students to direct interaction with citizens and participatory settings (temporary)
3. Community Gardens built and maintained by the self-organised residential groups, such as Seedling Buddies, Sony Permaculture Team, and an informal nature school (stable)
4. a hub project, Zero-Waste Action, joins all stakeholders' efforts to regenerate the community centre into an ecologically and socially friendly space (long-term)

Figure 3. Four kinds of temporary activities, from left to right and top to bottom: periodic activities (second-hand festival), design courses (temporary design in urban regeneration), community gardens (garden co-construction) and the Zero-Waste Action hub project.

3. Primary ecological outcome: Xinhua Zero Waste Project

The Shanghai pilot provides an example of spatial regeneration manifesting through participatory design methods, with ongoing small-scale and diverse initiatives that reinforced community ties. Over time, the community's strength enabled the motivation and implementation of a full-scale ecological intervention involving the whole community and multiple interventions, as described in Figure 4. Whilst the trigger of the ecology-related project came from the partnership between the university and the social enterprise, rather than a co-design process (like in Milan Expo are with

the collaboration with the elementary and middle schools in the area), pre-existing community ties eventually made it possible to collect a shared understanding of ecological relevance and to activate regeneration interventions related to people and nature as a consequence of the community's involvement in the regeneration process. Notably, it became a framework for other neighbourhoods and districts. The pilot program's development approach was compiled in the "Xinhua Practice" manual and has been extensively promoted and implemented across different communities in Shanghai. Under this framework, the regeneration of the Xilingjiazhai community in Huangpu District was carried out. Through a co-design process, a temporarily used space in the community was renovated into a community space for participatory activities.

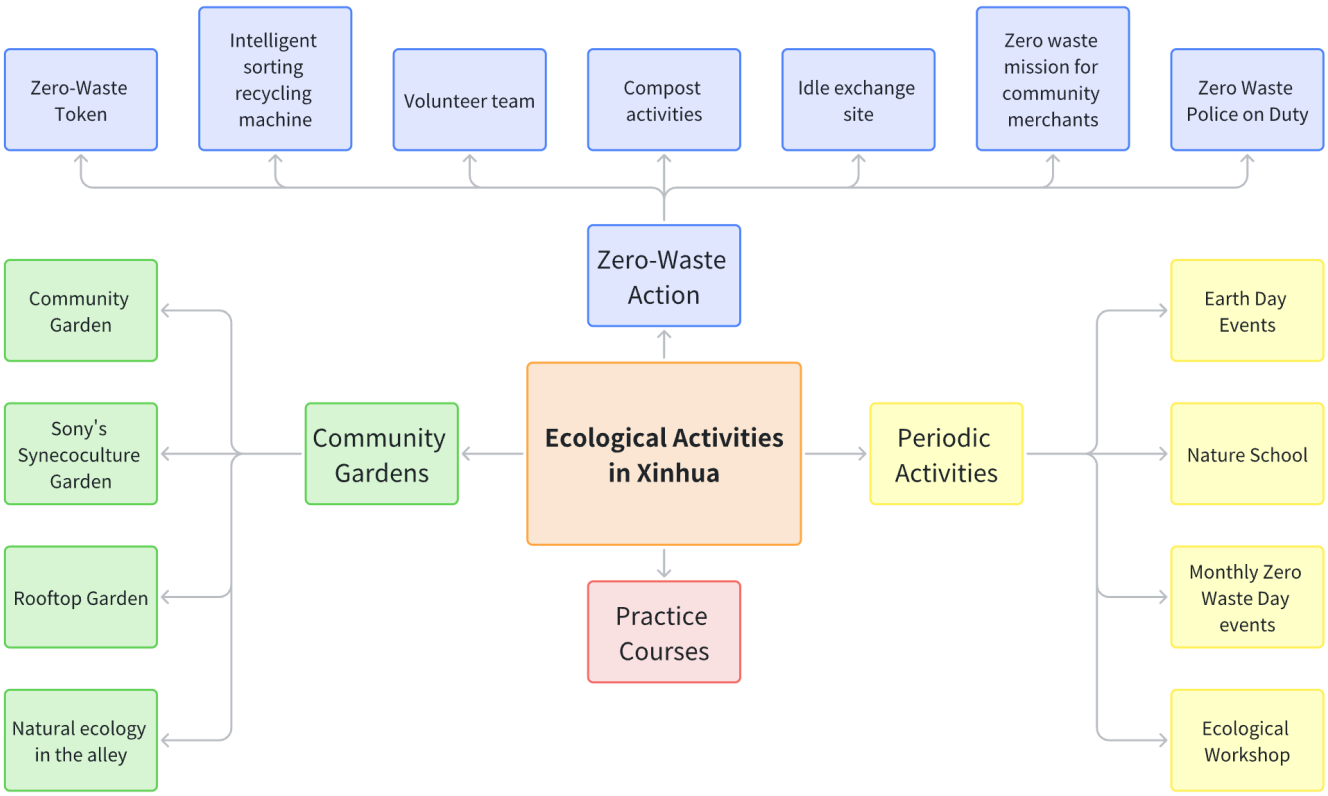

Figure 4. Xinhua Ecological Activities Framework at a Glance

As a hub of ecological projects in the area, the "Shanghai Xinhua Road Subdistrict Zero Waste Community Building Action" has a systemic, comprehensive structure that includes construction scenarios, activities, volunteer mechanisms, maintenance, and continuous planning and iteration. It is jointly designed by Xinhua community partners and supported by the Global Environment Facility Small Grants Program of the United Nations Development Program. With multiple practices and partners in the ecosystem, the project aims to build an innovative base for zero-waste communities in Shanghai, using the regeneration area as a pilot case. Therefore, we take it as a primary activity and outcome and explain the following details.

3.1 Construction of Core Zero-Waste Scenarios

The Zero Waste scenario is built around a human-nature lifecycle within the community. The circulation of idle goods, resources, and natural by-products, and the recycling stations, have undergone many iterations; every week, citizens and resident volunteers collect and organise unused items in the space and share their inventory on the community social platform, offering them for collection. More than 200 items are usually distributed each week. The scenario expanded to include a “zero-waste office park” as a platform for sharing idle items, with participants primarily from building management and office teams. This is an example of a participatory citizens' initiative that became integrated into the community's overall workflow and provided benefits and improvements to the organisation itself and, in a broader sense, to the

residential community of the neighbourhood.
The zero-waste community expanded into a team of the garden; they designed a lifecycle protocol for the garden activities, which include composting (collecting kitchen waste, garden scrap, and the urban greenery residual material such as branches and dried leaves), fabrication workshops for laser cutting and DIY construction of tools and garden furniture, and a community canteen.
This process generated a fascinating “citizen science” or grassroots data-collection experience for the residents, who were called upon, empowered, and trained to provide data for each community activity in Xinhua. This data collection went beyond “waste management” data; it included a lifecycle scenario for all activities, including the kitchen, garden, playground, coffee spot, etc. In this way, the “zero waste” concept is closely linked to an ecological and systems understanding of community resource cycles, and it has been developed autonomously from residents in different touchpoints (Figure 5).

Figure 5. Three examples of zero-waste implementation:
(a) Toy exchange house; (b) Idle material station; (c) Public recycling and upcycling station

3.2 Support of ecological projects in other residents’ communities

Temporary uses of the idle space have attracted members of neighbourhood circles and committees. A sub-district citizens group has reclaimed the second floor of the building as an extension of their operation. They established a rooftop garden built by residents, which includes gardening activities, learning sessions, and the maintenance of a beehive.
The convergence of different groups of independent citizens and their projects has allowed a proficuous sharing of knowledge and practices, further developing into a district-level alliance called “Fahuayuan Shared Planting Garden", which aims to complete the co-design activities of five other gardens in the district. The organisation of such initiatives is entirely grassroots and self-managed: almost 150 citizens were involved in the participatory process, with five external experts invited and a team of 30 volunteers regularly involved in program design, event planning, on-site execution, and other tasks.

Figure 6. Example Posters of Ecological Activities for the Community Garden

3.3 Grassroots Composting and Lifecycle

Composting is, of course, integral to the zero-waste project. After a one-year experimental phase that began with learning how to collect and upcycle dead autumn and winter leaves, a full composting protocol has been developed within the community. The community kitchen feeds the compost, and an open station has been installed for the neighbourhood to bring food scraps and other compostable materials. Fermented juice and topsoil are available to any citizens wishing to bring them home. The community experimented with different composting techniques, including DIY stations and testing various commercial solutions acquired or gifted. Most importantly, the hands-on prototyping and iteration process developed into an informal education and skill-set curriculum, made by the residents for the residents, involving guests and experts, and a programme of composting knowledge shared among the community.

Figure 7. Compost Buckets and Bins for use in the Community

3.4 Continuous exploration of other scenarios

In addition to the core scenarios of upcycling and recycling for managing common resources and goods, scattered actors and participants have also explored zero-waste-related experimental activities. Orange Sewing Shop is a shared sewing machine project initiated by a group of sewing enthusiasts. It uses second-hand clothes collected in the community to transform new items and reuse idle items. Born as a specific community of practice, the group is attracting the interest of visitors and passers-by, providing a platform for skill sharing and enhancement, and fostering strong bonds with dwellers and attendees who are not “members” or regular participants. This is an example of how the continuity of a participatory approach drives the spatial and temporal evolution of the place, providing emergent, unplanned regeneration opportunities.
On the other hand, the continuity of participation and the “hub” framework of the Zero Waste project also promote the establishment of more structured volunteer roles and enhance participation dynamics. While participation was mainly activity-based in the past, a challenge would have been maintaining a connection beyond social media. The community lacked a mechanism to retain participation and to support year-round training. The zero-waste project introduces a dynamic timeline for daily, weekly, and monthly territorial interventions, diversifying the type of participation and engagement. This dynamic allows people to contribute at the scale of the daily routine (e.g., composting), collaborate in weekly circles (e.g., sorting and distributing idle items), and enjoy the benefits of monthly public activities and learning sessions.
These can provide volunteers with more diverse and engaging participation paths.

Figure 8. Sewing activity organised by Orange Sewing Group

4. Discussion and Conclusions

4.1 The value of ecological activities

Ecological activities in the community mainly enhance and maintain the environmental system of the community space and construct community organisations.
From the perspective of spatial renewal, the most direct role of ecological activities is to establish and improve environmental infrastructure and to stimulate a sense of community embodied in urban ecology. Taking the project site as an example, community public lawns, vegetable gardens, Sony cooperative farming gardens, and rooftop gardens have been built through self-organisation by residents, construction by operators, donations and cooperation by third parties. Some spaces are idle, and this construction activity also allows for the flexible use of space. Some small and medium-sized idle spaces or ancillary spaces have been activated. For example, a grey space at the corner of the alley, an unused space at the building entrance, and an unused roof can host temporary uses and are available for the community to experiment in their territorial playground.
From the perspectives of community building and governance, ecological activities share the typical characteristics of community participatory activities and also have unique ones. They can stimulate the emergence and development of local self-organised practices across stakeholders. Local organisations and operating departments generally lack professional knowledge of ecological activities, and their organisational goals are more focused on platform construction and space operations than on developing a specific ecological topic. Cooperation with environmental organisations can promote more ecological activities, thereby completing spatial renewal and community design through territorial co-benefits. Local community design organisations are responsible for building the platform and providing professional community participatory knowledge. The space operation team integrates local resources for daily

infrastructure maintenance and ecological site planning. Ecological organisations offer professional expertise and organise and build communities related to issues. The three form a cooperative and complementary relationship. The University brings knowledge and resources and collaborates with multiple stakeholders, providing the opportunity to systematise the resources and the outcome of the participatory process.

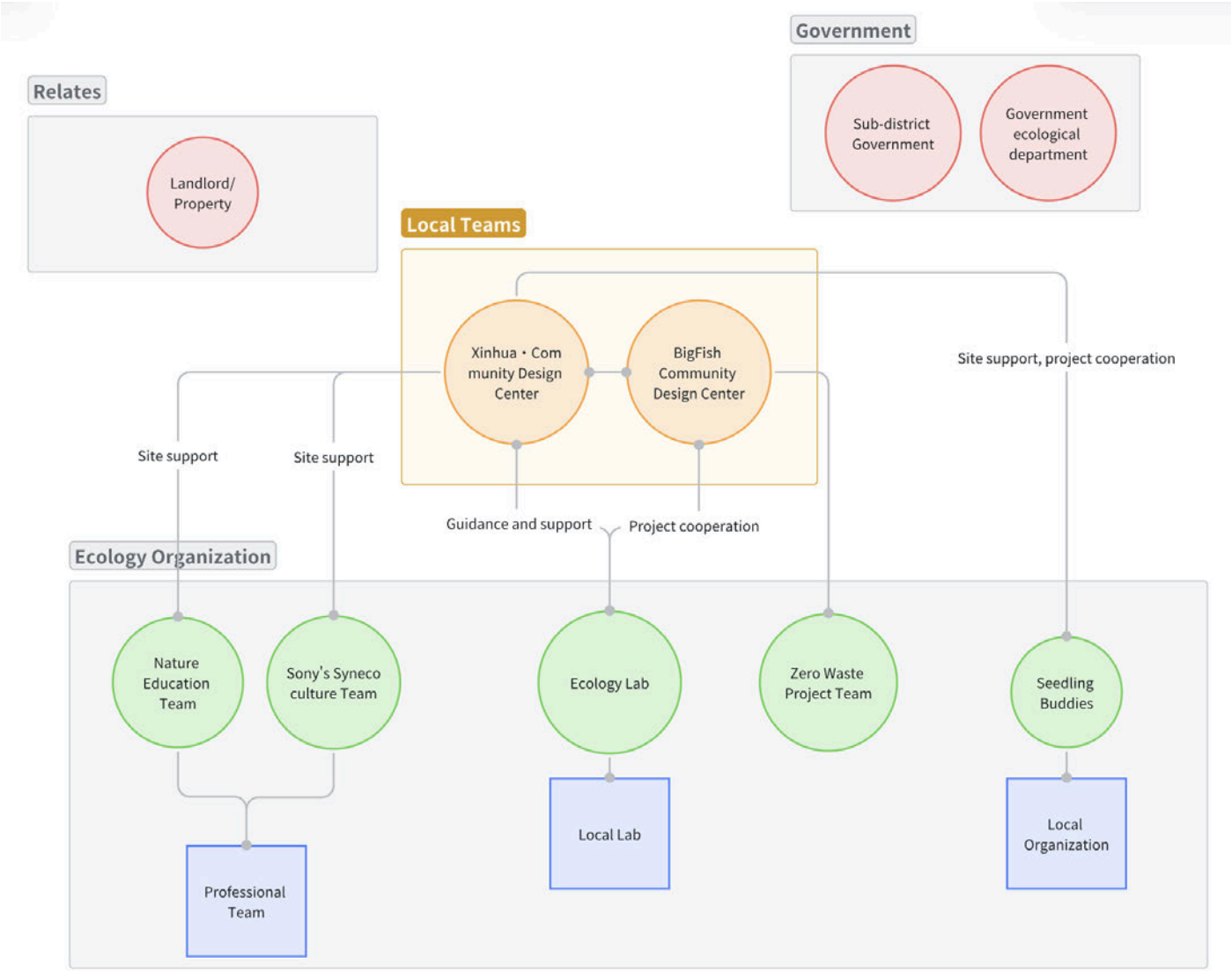

Figure 9. The Stakeholders Map of Xinhua Ecological Activities

Table 2. Examples of integrated activities of territorial regeneration across stakeholders.

Regular residency	The university team has a fixed workstation in the shared office project on the second floor and participates in community activities under a "daily residency" model. This helps the laboratory understand the local situation promptly and enables the laboratory's concepts and work ideas to be better integrated into the community.
Activity participation and co-creation	Through organising time-relevant activities (such as Earth Day and the Community Park Festival), the university team attracts local residents interested in urban renewal and urban ecological research to join the local team, continuously strengthening the community's participation in urban environmental construction and injecting new vitality into community building.

Course cooperation	The University develops context-based, community-led curricula that challenge students to work in real-world scenarios and leverage community development constraints as design opportunities. Different courses are introduced to extend the learning settings and modality to community participation, e.g., how to design and fabricate interactive artefacts to reconnect residents with urban nature, or how to generate communication strategies for the community (installations, workshops, graphics, and products) to engage in ecological topics and steward environmental and ecological regeneration of the spaces.
Networking and knowledge generation	The "Weaving Wording" project is a good example of multi-stakeholder collaboration in participatory design that renovates the traditional craft of cotton production and weaving (which is very important for the local and natural history of the area). It preserves oral history through storytelling while weaving. By exploring the local eco-history and culture, the residents' sense of belonging and cohesion is enhanced, and the in-depth regeneration of community spaces is further promoted.

4.2 Challenges and Reflection

Engaging citizens in urban ecology initiatives can be challenging, particularly for those who are not sensitised to or interested in these topics. Many are more willing to participate in simple community ecological activities, such as experience-making and daily care, rather than to sustain continuous engagement; nature has a slow rhythm, even amid the bustling dynamics of cities. Adaptation, regeneration, and growth must occur for green areas and biodiversity initiatives to thrive; they happen over time and despite planning or requirements for achievement. Failing to recognise this temporal dimension can lead to dashed expectations, weakness in citizens' engagement, and long-term fatigue or participation decay. Temporary uses offer an alternative to planning and favour small-scale initiatives that create shared benefits between people and spatial regeneration, giving more or less explicit voice to existing 'green' communities. It is indeed a slow process.
Improvement involves systematic monitoring and evaluation of the participation dynamics and the quality of the outcomes. Assessing the results and outcomes of temporary green interventions is significant for informing and influencing high-level decision-making and support, which means that participatory efforts may scale out and become relevant beyond the boundaries of the community that generated them. This frames temporary uses within the challenge of long-term management and planning, yet opens the possibility of grassroots governance of the commons and the generation of a participatory legacy.
This exploration of participatory experiments highlights innovative approaches to urban regeneration and emphasises the critical role in fostering adaptable and inclusive urban environments. By this analysis and the outcomes from the overall international research project T-Factor, we contribute to the discourse on sustainable urban practices and the transformative potential of collaborative design in environmentally conscious territorial development.

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"NARYN URBAN RESILIENCE PROGRAMME (NURP): A MODEL FOR COLLECTIVE URBAN RESILIENCE IN HIGH-RISK MOUNTAIN SETTLEMENTS"

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ABSTRACT | The collapse of the Soviet Union triggered an economic downturn that transformed the Naryn town of Kyrgyzstan, once an agro-industrial hub, into a town marked by closed factories, deteriorating infrastructure, and scattered, under-utilized industrial land. This decline has fragmented the town, diminished its vibrancy, and negatively affected its socio-economic fabric. The paper discusses selected results of the Naryn Urban Resilience Programme (NURP), a programme supported by Economic Cooperation and Development Division of the Swiss State Secretariat for Economic Affairs (SECO), with co-funding from the agencies of the Aga Khan

Development Network (AKDN) and advisory support from the United Nations Human Settlements Programme (UN-Habitat).

To identify and subsequently tackle social, economic, and environmental factors, NURP drew insights from Transition Design (Irwin, 2018) and applied an Integrated Habitat Assessment (IHA). Through granular risk perception studies and neighbourhood assessments a perpetual loop has been created in which planners, designers and decision makers can attain a shared understanding of multistakeholder possibilities and innovation. This was achieved by way of co-implementation with residents using approaches like tactical or acupuncture urbanism, where targeted, small-scale interventions spark further renovation efforts and resilience across the city.

NURP showcases opportunities for nature-based design solutions aimed at fostering a sense of ownership, inclusivity, and grassroots entrepreneurship. Besides, it serves as a case study to reveal the multilayered, deep-seated complexity of urban resilience programmes in a non-Western provincial context where an engaged citizenry is underdeveloped. This undermines the bottom-up approach and shifts the public discourse for sustainable and climate friendly resilient futures in favour of the upper echelons of power. The critical lens contributes to the emerging methodological awareness of a place-sensitive, situated, postcolonial approach to understanding and the implementation of participatory design.

KEYWORDS | NARYN, NURP, URBAN RESILIENCE, HABITAT ASSESSMENT, INNOVATION

1. Introduction

Naryn is an example of a remote post-Soviet mountain town that embodies a unique legacy and faces profound socio-economic and environmental challenges, increasing its vulnerability to external shocks. Naryn is a mid-sized, sliver-shaped mountain town in a river valley amidst the magnificent Tian Shan mountains of Kyrgyzstan. Snowy winters and climate-induced natural hazards from the surrounding mountains and the turbulent river are a regular feature of this town. Traditionally, it has been the home of nomadic herding tribes in the high mountain regions of Central Asia and an important node on the famous Silk Route bordering China. The town lies on the main trade route between China and Eurasia at the confluence of popular tourist routes leading to spectacular glacial lakes and hiking trails. The collapse of the Soviet Union triggered an economic downturn that profoundly impacted Naryn, transforming it from a thriving regional agro-industrial hub into a city marked by closed factories, deteriorating infrastructure, and scattered, under-utilized industrial land. This decline has fragmented the city, diminished its vibrancy, and negatively affected its socio-economic fabric, leaving it more vulnerable to external shocks, including economic crises and climate-related risks.

Figure 1. Naryn from the south (Wikipedia contributors, 2024)

The paper discusses selected results of the Naryn Urban Resilience Programme (NURP), a programme supported by the Economic Cooperation and Development Division of the Swiss State Secretariat for Economic Affairs (SECO), with co-funding from the agencies of the Aga Khan Development Network (AKDN) and advisory support from the United Nations Human Settlements Programme (UN-Habitat). The paper presents cases for nature-inspired design strategies adopted to foster inclusivity, promote grassroots entrepreneurship, and enhance participatory decision-making processes for sustainable and climate-resilient development. The paper focuses in particular on three key outcomes: institutional strengthening through capacity building and governance systems; improved resilience-informed planning via inclusive stakeholder engagement and knowledge-based assessments; and a realistic, long-term, evidence-based investment plan for sustainable growth (Table 1). These outcomes were validated through tangible initiatives, including resilient infrastructure construction, urban design recommendations, resilience-based enterprises, and economic opportunities, all emphasising risk mitigation, participatory decision-making, and long-term sustainability. The paper also discusses contributions of these outcomes to urban resilience in the context of post-colonial mountain towns.

Apart from the tangible outcomes, the paper seeks to shed light on the discursive limitations inherent in participatory design methodologies within the post-development and Transition Design paradigms when applied to non-Western provincial settings such as Naryn. Using Causal Layered Analysis (CLA) as a diagnostic tool (Inayatullah, 1998; 2008; 2017) for understanding emerging futures, the paper highlights two discursive barriers that NURP, as a participatory

project, faced in Naryn. At the level of "Myth/Metaphor," there exists a deeply embedded perception that the state is the sole agent of provision and development, disregarding the civic role of grassroots agency. At the level of "Worldview/Discourse," the dominant narrative across the community frames financial scarcity as the primary obstacle to development, overshadowing systemic issues of governance and participation. These constraints manifested in community disengagement and scepticism, and limited co-creation activities toward externally funded initiatives, complicating efforts to foster distributed ownership and long-term resilience. Consequently, critical questions emerge regarding viability of collaborative frameworks between external funders and local stakeholders, particularly in contexts where civic agency is historically underdeveloped. Furthermore, reconciling top-down governance structures with participatory design methodologies proves challenging, particularly when seeking to build resilient bottom-up transformation pathways.

Building on the above observations, the paper contributes to the emerging critique of participatory design's methodological limitations in provincial, post-colonial settings. It underscores the need for more situated and place-sensitive approaches to resilience and emerging futures. From a critical perspective, the paper hopes to stimulate discussion on the following question: How can designers and urban planners achieve participatory multistakeholder design outcomes in communities where short-term interests and gains for political purposes take priority over a systems-level approach for long-term sustainable solutions?

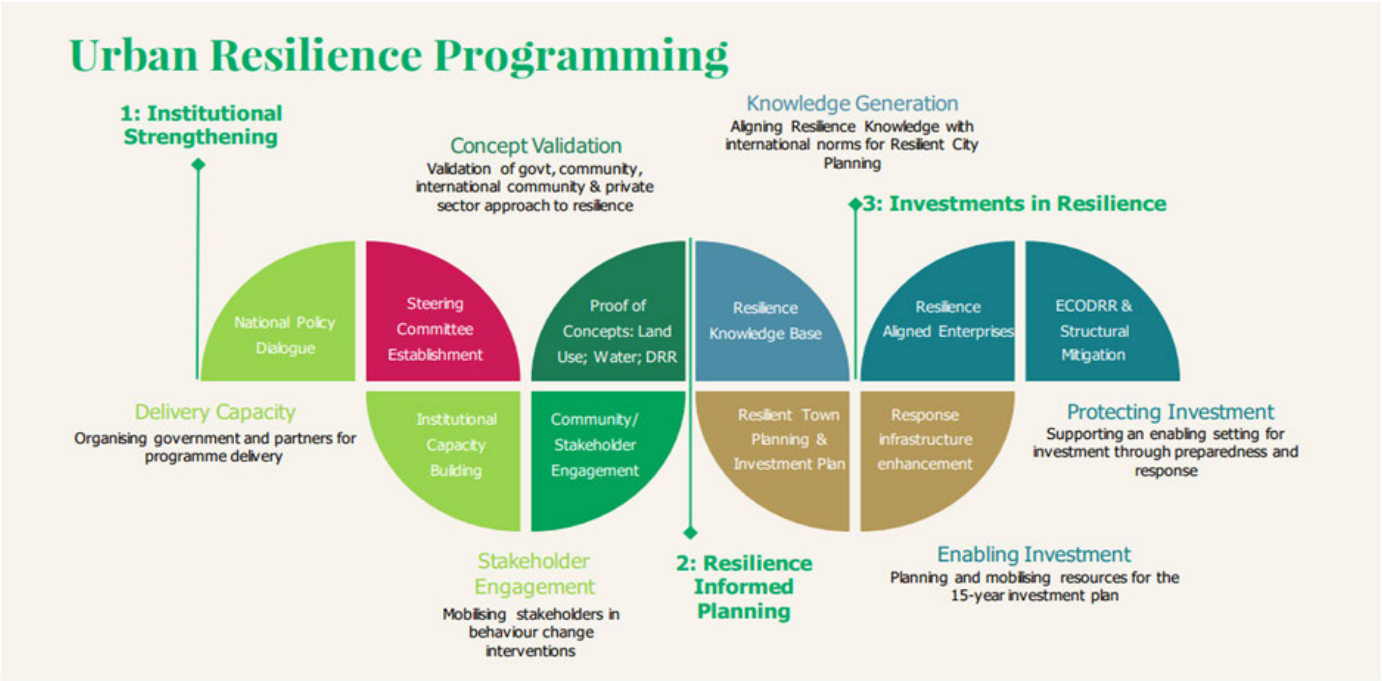


Table 1. Principal outcomes of NURP project activities

2. Theoretical grounding

In recent years, scholars have found the ontological view of moving beyond a monolithic vision of community development and design intervention for a rather bottom-up, inclusive, participatory, contextually relevant, interconnected approach more inclusive, sustainable, and ultimately resilient. Arturo Escobar's writing on pluriverse (2018) and relationality (2024) epitomises the efforts in this direction and offers a response to the longstanding deep-seated hegemony of value dichotomies and dualities (i.e., nature, human; body, mind; global north, global south; developed, underdeveloped, etc.) running deep in our understanding of structures of life, modernisation, and shared futures. Pluriverse and relationality offer an alternative framework to address, or at least alleviate, the contemporary crisis-ridden conditions, or "toxic loops" in Escobar's words, we are entangled in. Escobar's ideas provide essential insights into urban resilience and sustainability discussions, moving beyond monolithic community development visions toward inclusive, participatory, and contextually relevant socially resilient approaches.

The above outlook derives from decoloniality discourse and the critique of development metanarrative through the works of Escobar (1994), Rahnema (1991; 1997), Sachs (1999; 2000), Ferguson (1990), among others, since the 1990s as an attempt to dismantle the hierarchical order of the world or what Ferguson (ibid.) calls "development discourse fantasy". Sachs in his seminal work *Planet Dialectics* (1992, p.3) holds that "...the idea of development stands like a ruin in intellectual history, its shadow obscuring our vision." This line of reasoning, particularly Ferguson's focus on the discursive aspects of development, can be well traced back to Michel Foucault and his observations in *The Order of Things* (2012/1966) concerning the epistemic paradigms and hierarchies defining the principles of consensus and repudiation in science and social institutions. Ultimately, the critique underscores the need to rethink entrenched value systems underlying and orienting our concepts of progress and development. It advocates for alternative approaches that address systemic inequalities, and that envision more inclusive, distributed, and sustainable futures.

Contemporary design scholarship builds on critiques of development metanarratives and the hierarchies they stand for and perpetuate. The failure of unsustainable development under the spell of industrial capitalism (and colonialism) is captured in Tony Fry's notion of "defuturing" (2020). In simple terms, defuturing refers to "[t]he negation of world futures..." (ibid., p.10). The growing awareness concerning a world filled with looming doom has shifted design practices, moving from unsustainable and makeshift approaches to more sustainable and pluriversal futures. This emerging vision is well captured in Transition Design theory. As elaborated by Irwin (2018, p.968), Transition Design keeps in sight the larger picture that allows to (1) "visualise and map complex problems and their interconnections and interdependencies; (2) situate them

within large, spatiotemporal contexts; (3) identify and bridge stakeholder conflicts and leverage alignment; (4) facilitate stakeholder in the co-creation of visions of desirable futures; (5) identify leverage points in the large problem system in which to situate design interventions". Integrating a holistic perspective and prioritizing collaboration, Transition Design offers an effective framework for envisioning and delivering design innovation in complex settings. Despite the setbacks and challenges (see below), NURP demonstrated commitment to design principles in line with those of Transition Design.

Furthermore, NURP captured elements of the urban nexus concept (Lehmann, 2018), systems thinking (Arnold and Wade, 2015), and circular models (Thackara, 2015; Williams, 2021) to address the multifaceted challenges of sustainable urban development in Naryn. These practices collectively inform a systemic, cross-sectoral understanding of resilience, emphasising collaboration among diverse stakeholders. However, while offering a valuable alternative to conventional, siloed planning paradigms, their application within the provincial, post-socialist context of Naryn necessitates critical adaptation. The project's outcomes therefore not only showcase attempts at participatory, community-driven solutions but also offer critical insights that can help to interrogate the universalist assumptions embedded in the global circular models and design principles. From this perspective, NURP underscores the importance of place-sensitive, post-colonial approaches to sustainable transformation and emerging futures.

3. Methodology

Being informed by the participatory principles of Transition Design, NURP adopted the Integrated Habitat Assessment (IHA, Table 2) to study and assess hazards, demographic distribution, and the carrying capacity of the land to prioritise, strategize and implement town resilience interventions. IHA methodology was built upon AKDN's HVRA (Hazard Vulnerability Risk Assessment) methodology and analytics on Resilience indices such as Environmental Index and Integrated Habitat Index (Table 3). The methodology emphasises strong stakeholder engagement and consultation throughout the process to understand the current habitat-related challenges, gaps, and opportunities, to collect authentic data, and to validate assessment outcomes and endorse recommendations towards resilient planning. The assessment process was informed by a thorough literature review, desktop studies of national and international best practices and pre-defined methodologies. Further, field studies with a focus on geology, geo-botanicals, forestry, water management, infrastructure, climatic data as well as sample surveys for qualitative and quantitative data collection and triangulation were carried out to supplement secondary data.

In addition to the recommendations of the IHA, other considerations in selecting projects to serve as proofs of concept included the strategic plans of the Town Council, the Mayor and the Oblast

level administration, the long-term vision of AKDN and the overall alignment of all of which with the donor SECO's grant-making principles. This tripartite decision-making formed an integral part of the project's governance structure and ensured collective accountability and commitment to joint decisions. IHA results also served as the base referral document for resilient town development programming – with critical and cross-sectional analysis of various socio-economic and environmental factors – in Naryn. The findings were used by various decision-makers, policy-formulators, academia, community members and other key local stakeholders. In addition, the results of IHA contributed to developing the course content for the Certificate Programme in Urban Resilience through sensitization, awareness, training and capacity building. The intention was to create a multiplier effect for resilient planning and development during the implementation of NURP and beyond.

Table 2. Integrated Habitat Assessment - Methodology flowchart

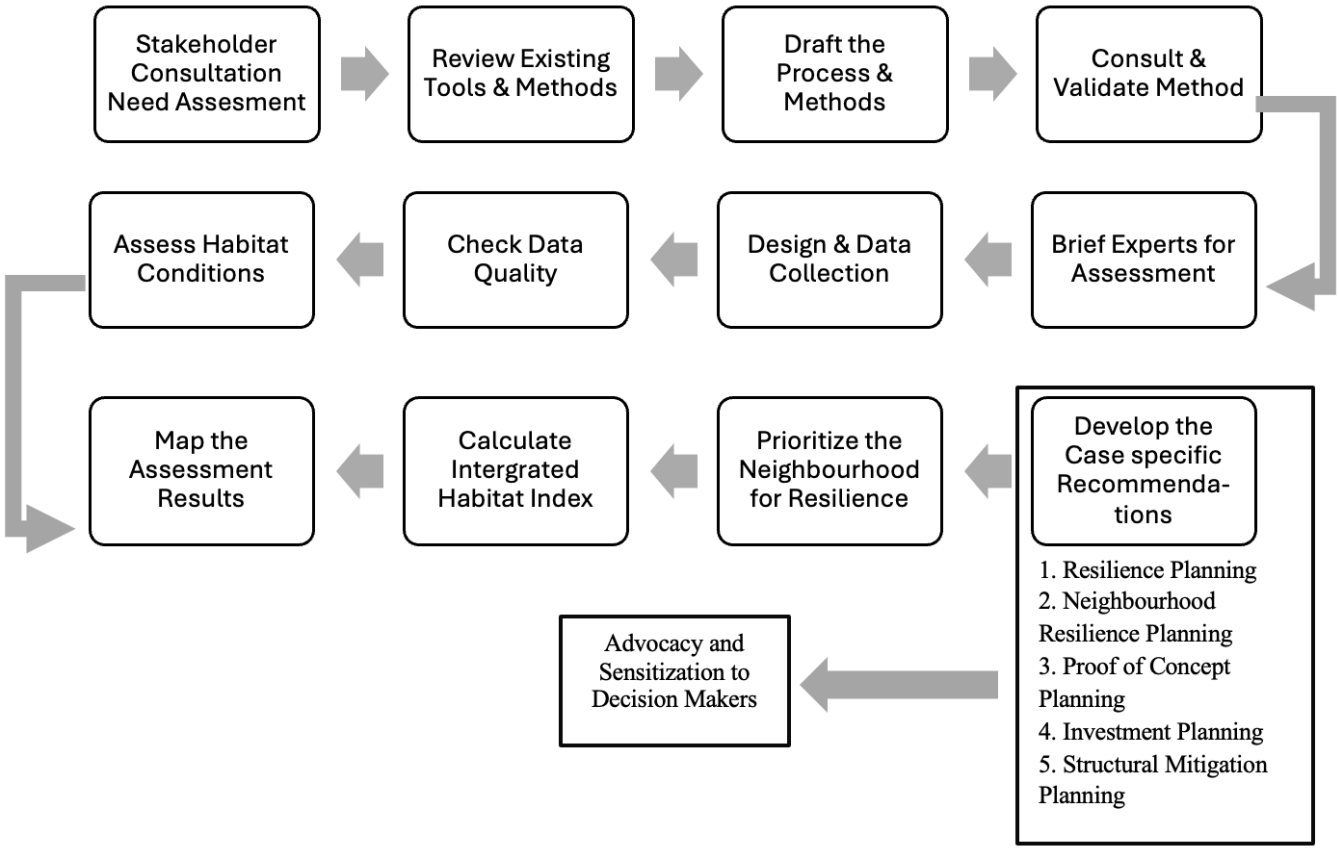
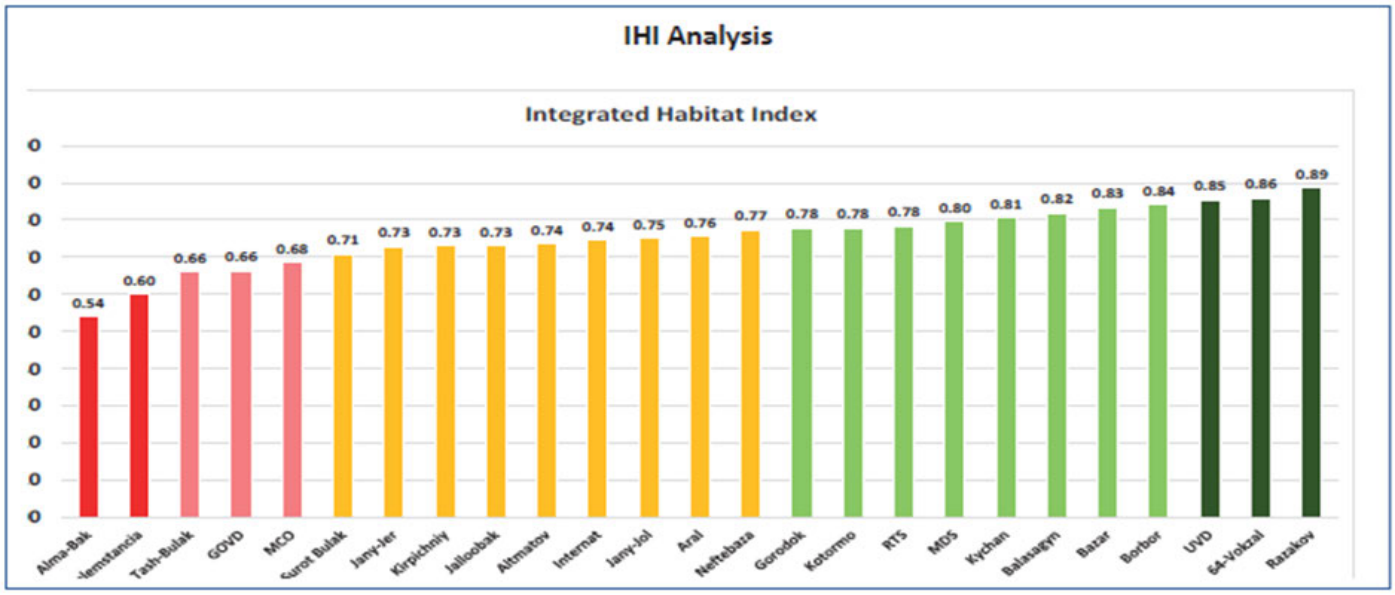


Table 3. Integrated Habit Index derived from Hazard Exposure, Demographic Sensitivity, Infrastructure, Services and Environmental indices



4. International case studies

4.1. Matam Urban Renewal, Conakry, Guinea

The renewal of Matam, a largely informal yet vibrant district in Conakry, Guinea, served as a reference case for NURP in terms of managing conflicting development approaches. City officials pursued a modernised image through large-scale and capital-intensive clearance and infrastructure upgrades, risking displacement of the local community. The residents, in contrast, demanded improvements that would preserve their homes, identity, and the right to shape the area's future.

UN-Habitat adopted a decolonised, context-sensitive, and inclusive planning approach to bridge the opposing visions. Rather than imposing solutions, it co-developed a community-driven framework grounded in local priorities. At its core was a set of design rules and negotiated incentives that fostered consensus among residents to improve their living environment. For instance, those who voluntarily contributed small portions of land for public use (street widening, setbacks, etc), would be granted formal land tenure, rights to vertical expansion and upgrading and access to investment opportunities.

The above approach repositioned the community as the primary agent of change while assigning the city the responsibility for upgrading infrastructure, public space, and facilities. The process fostered consensus-building, reduced resistance, and avoided forced evictions.

Ultimately, the proposed strategy demonstrated a hybrid planning model that transcended top-down imposition, rooted improvements in lived realities, and prioritised community agency (UN-Habitat 2022).

Figure 2. Community engagement activity

4.2. Khorog, Tajikistan

Another precedent for NURP was a resilience planning project in Khorog, Tajikistan, a city with a strong tradition of community collaboration. The project shifted the role of residents from passive recipients to active participants. Leveraging local organisational structures, the project fully involved the community in planning, from idea generation to decision-making. Community representatives played a key role in project prioritisation and capital investment planning with proposals valued equally alongside those of officials and technical experts. This inclusive

approach strengthened local ownership and ensured that community-driven solutions had a meaningful impact on the city's resilience strategy (UN-Habitat 2023).

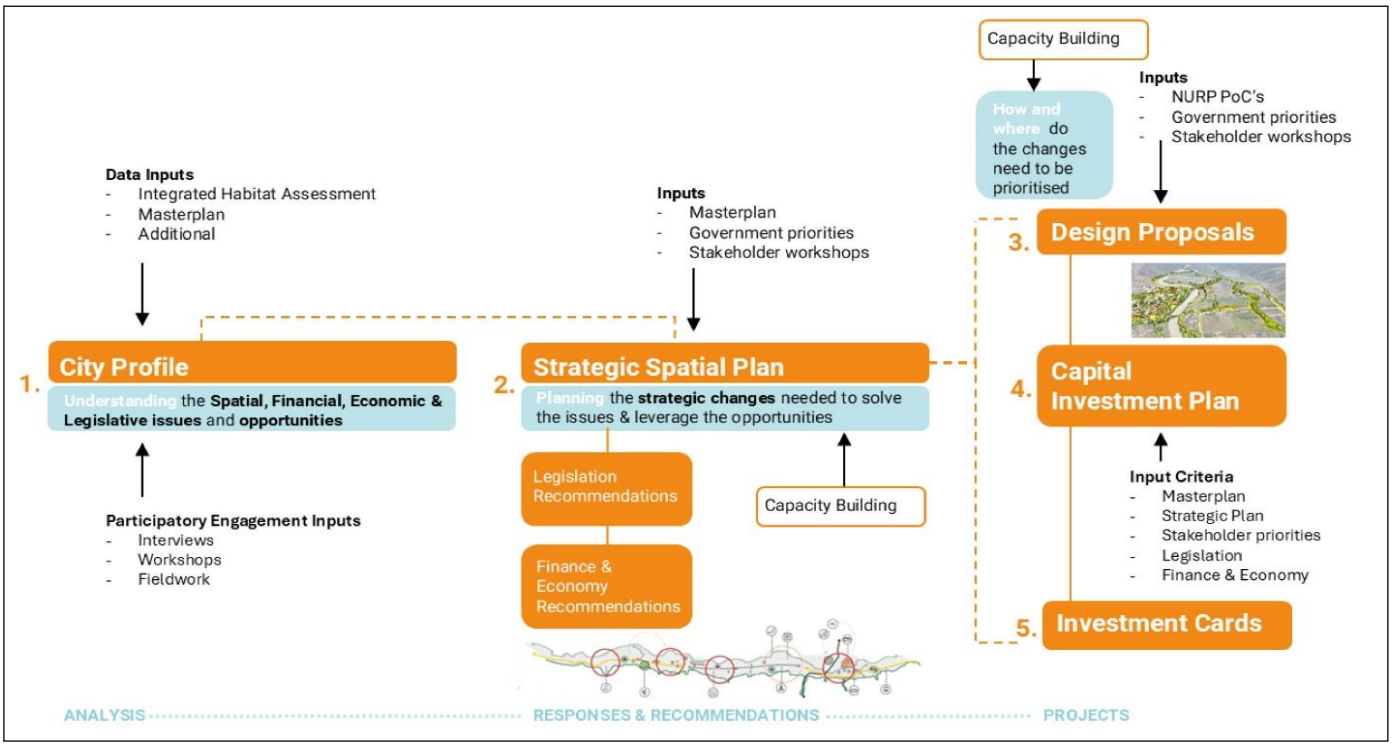
5. Initiatives and implementation

A series of interconnected activities were developed and implemented to achieve the project's three principal outcomes, of which three specific cases are presented below. The lessons learned from these interventions and the broader project outcomes offered valuable insights into connecting NURP to wider academic scholarship on urban resilience, participatory governance, and sustainable development.

5.1. Participatory strategic planning:

The UN-Habitat (2024) intervention in Naryn faced a fundamental challenge: reconciling the differing visions of the town's development held by government officials, young residents, and business representatives. While the government focused on economic revitalisation and administrative priorities, younger residents sought inclusive spaces for recreation, innovation, and social interaction, and business representatives prioritised economic growth and improved connectivity (see Table 4). These competing perspectives coupled with limited resources, socio-spatial inequalities, and the town's vulnerability to natural hazards underscored the complexity of creating a shared development vision.

Table 4. Process flow followed for project identification, prioritisation, planning and implementation of resilience projects



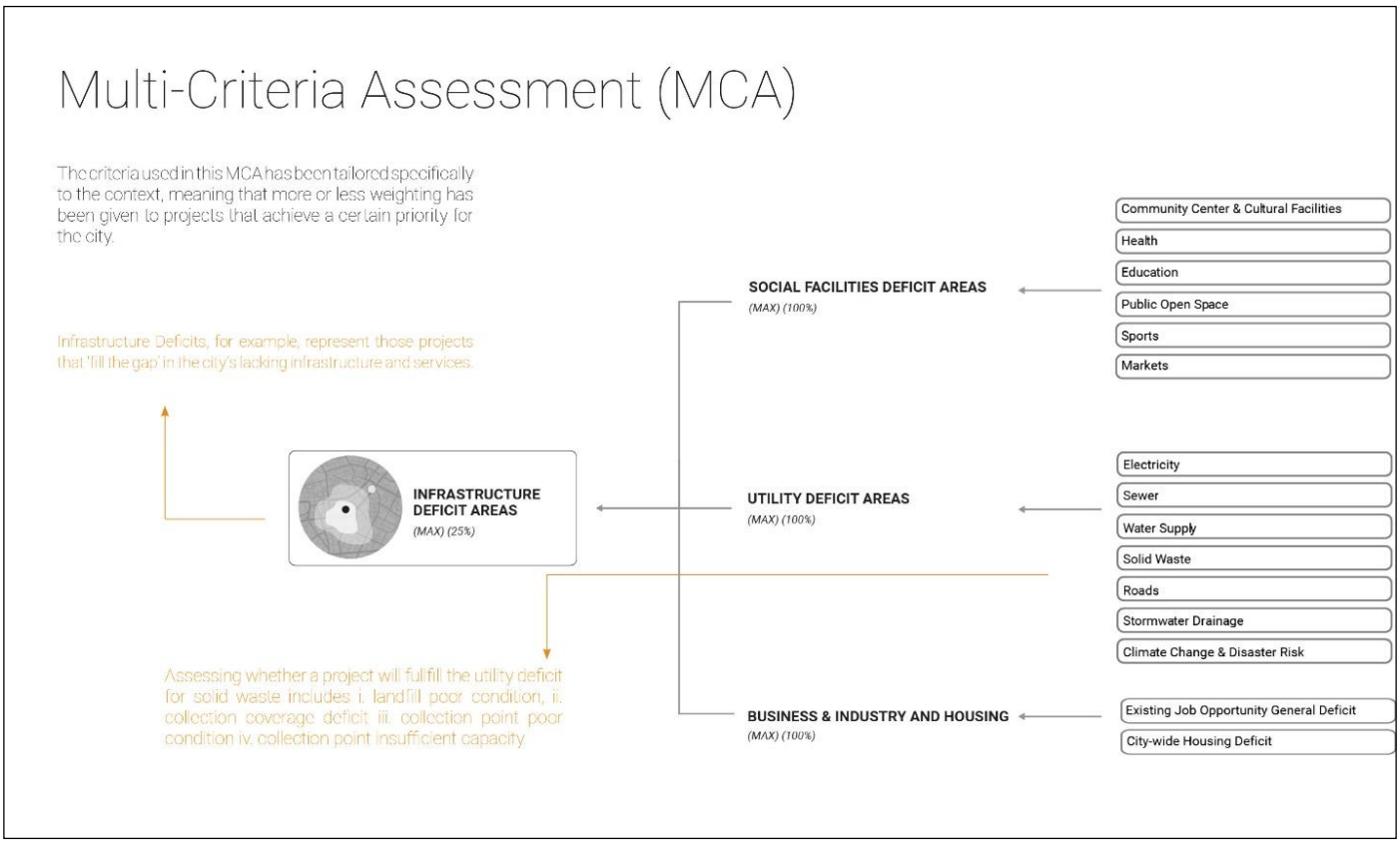
UN-Habitat, which partnered with NURP, approached this challenge by embedding community engagement at the core of its planning process, using the "My Neighbourhood"[1] framework to converge diverse stakeholders' interests towards clear city objectives: Compact, Connected, Vibrant, Inclusive and Resilient. Initial assessments and risk perception studies revealed the critical gaps in infrastructure, accessibility, and neighbourhood resilience. Through collaborative workshops, participants began to articulate their priorities. Emphasis on vibrant, multi-functional public spaces was balanced with the government's goals of infrastructure development and the business community's focus on economic potential.

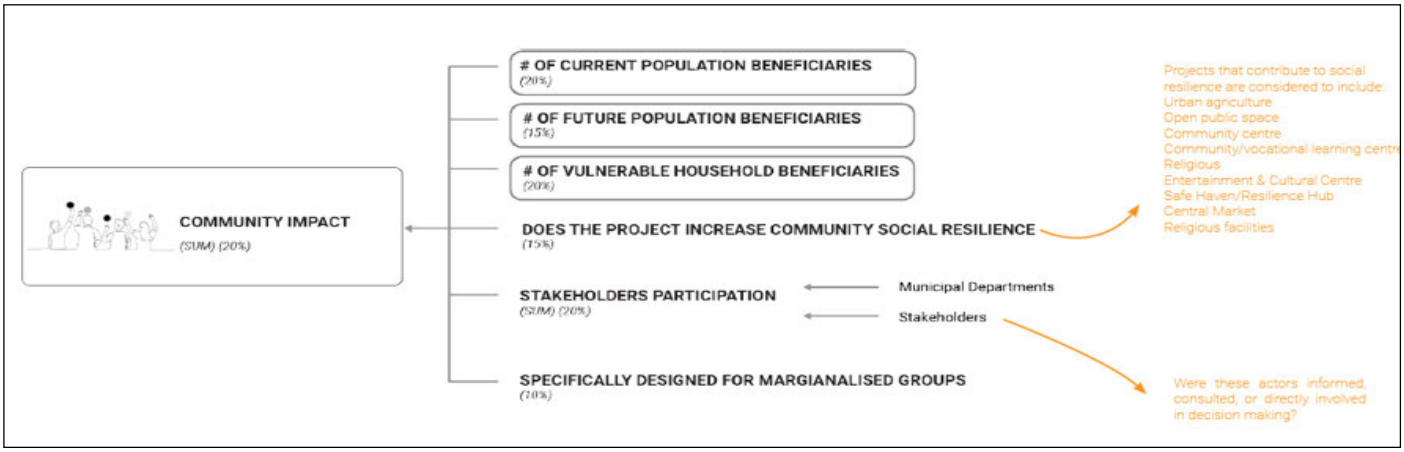
Demonstration projects, including the renovation of Jusaev Park and improvements on the Naryn Central Market, exemplified this co-production approach. Community members were actively involved in the design process, with women emphasising safety and accessibility, while youth contributed ideas for dynamic and engaging public spaces. These collaborative efforts yielded designs that reflected the community's diverse needs, while also promoting resilience and inclusivity.

[1] For more information see: https://unhabitat.org/my-neighbourhood

NURP and UN-Habitat also addressed the town's resource limitations by adopting a spatially-informed investment planning framework. The framework ensured the prioritisation of interconnected and complementary projects designed to generate transformative impacts across multiple scales (Table 5). Therefore, selected projects, such as mixed-use developments and infrastructure upgrades, were designed to be contextually relevant, with the potential to generate long-term socio-economic benefits. Legislative and policy recommendations further strengthened the institutional framework needed for implementation, while participatory governance created a sense of shared ownership and accountability among stakeholders.

Table 5. Illustration of MCA Process (UN-HABITAT, 2024)





By integrating the perspectives of government, residents, and businesses into a cohesive strategy, the project assessed the challenges of collating their varying perspectives on development and had to innovate strategies that would help overcome initial tensions and align divergent priorities. The process demonstrated how participatory planning can transform complex urban challenges into opportunities for collaboration, fostering a sustainable and resilient future for Naryn despite pushbacks and resistance to stepping away from colonial legacies.

5.2. Renovation of a Public Park

Table 6. Visualisation of the Jusaev park renovation (El Proekt LLC, 2024)

Naryn's acute shortage of public open spaces for recreation and social interaction was identified during habitat assessments. This was validated by the Mayor's Office, which requested NURP's support for the renovation of Jusaev park. This provided an opportunity for UN-Habitat's team to demonstrate how strategic recommendations can be translated into concrete and implementable actions at the neighbourhood scale.

The park (Table 6) was designed to be a catalyst for multidimensional change, driving urban renewal and bolstering the city's overall resilience. Though the design of the park was intentionally open-ended, offering a flexible framework that would invite creativity and collaboration among the city, the community, and other stakeholders, allowing the space to organically evolve in response to the community's needs and aspirations, adaptation of this concept by local designers still carried vestiges of colonial-era design accents.

- Institutional Framework

In an attempt to explore whether a motivated and engaged community is more effective than a reticent government in bringing about a resilient transformation, the park renovation offered an

opportunity to engage the community in the design process. The aim was to empower the community in decision-making, marking a clear shift away from prevailing top-down approaches. This was facilitated by collecting suggestions and ideas to create an inclusive space for the park's design, construction, and management. This allowed the project to embody a shared vision, creating a public space that reflects the collective identity and spirit of the local population and fostering a sense of ownership.

Stakeholder meetings, involving government, civil society, and the community (including the elderly, women, and youth), addressed key urban challenges, informing a master plan that established the conditions for creative use and adaptability of the spaces to meet the evolving needs of the local community. This philosophy was reflected in the multifunctionality and versatility of the proposed spaces and amenities, which were designed to be multi-generational, inclusive, climate-adaptive, culturally significant, and ecologically rich. It was also a reflection on whether community participation and inculcation of grassroot leadership could accelerate post-colonial transformation.

Figure 3. Community engagement activity

- Resilience and Sustainability

Consultations with the city's technical experts identified challenges in the city's parks, particularly regarding irrigation, winter functionality, and maintenance. In response, the park was developed as a green infrastructure integrating cost-effective nature-based solutions for stormwater management, energy efficiency, and biodiversity enhancement.

Key strategies included a sponge-city approach for stormwater and snowmelt retention, seamlessly incorporated into the landscape, i.e., biotope micro-forest, recreational lake. A gravity-based irrigation system further optimized water distribution, minimizing reliance on energy-intensive pumps and reducing long-term operational costs. Furthermore, the park's landscape design prioritises native vegetation, requiring minimal maintenance and irrigation while enhancing local biodiversity and reinforcing regional identity.

Figure 4. Visualisations of the park (UN-HABITAT 2024)

- Sustainable Investment

The park's viability extended beyond its design and aesthetics to encompass financial sustainability. For Jusaev Park, this would mean integrating a phased development and revenue-generation strategy into the spatial design to support maintenance and improvements. This includes revenues from seasonal festivals, pop-up markets, concerts, as well as cafés, restaurants, and kiosks that could be leased, co-financed or co-managed through public-private partnerships (PPP). These revenue streams would provide a consistent flow of funds, for reinvesting in the park's maintenance and further development.

5.3. Engaging residents in co-creation of public spaces and fundraising

NURP paid special attention to the capacity building for local government and residents by engaging them in learning about how to co-plan and co-develop public spaces using nature-based solutions (NBS). However, this ongoing institutional strengthening process has been challenging, particularly in reconciling diverse perceptions of urban greening and public space

development among residents and government officials. The town's existing green spaces – dominated by non-native species planted during the Soviet era – were poorly suited to Naryn's environmental conditions. This legacy exacerbated the town's vulnerability to climate risks while diminishing its urban character. To address these issues, the project team, in cooperation with SILK (Society for Innovations with Local Knowledge), launched a series of community-driven activities to build capacity and raise interest in urban greening using local flora. To fill the knowledge gap about landscape design and the ecological benefits of native plants, NURP developed a Kyrgyz Landscape Catalogue, a comprehensive guide featuring native species suited to the local climate. Residents and local governments have now begun using the catalogue to study sustainable landscape designing.

Discussions with local government representatives and residents revealed differing stakeholder preferences, with regional government officials initially favouring expensive concrete constructions, while residents and businesses have advocated for cost-effective, nature-based solutions using local materials. The project bridged these perspectives through continuous dialogue and knowledge-sharing, fostering consensus on resilience-informed planning. The integration of acupuncture urbanism by focusing on demonstration sites such as the Panoramic View in Tosh Bulak (a neighbourhood on the western periphery of the town) has shown how targeted interventions can generate broader socio-environmental benefits while strengthening community ownership of public spaces. This led the team to determine whether community ideation could contribute to spatial transformation in remote, post-socialist and -colonial mountain towns.

To ensure the sustainability of urban resilience efforts, NURP developed a structured investment framework that aligned with evidence-based planning principles. Training sessions on resource mobilisation and fundraising were planned to empower local stakeholders to attract funding and implement greening projects independently. The project also introduced evaluation tools to guide investment decisions, prioritising interventions that enhance resilience rather than vanity infrastructure projects. At its core, NURP has been an effort to lay the foundation for a long-term, locally driven urban resilience strategy. Despite the challenges and gaps in government and civic structures, progress was made by integrating scientific assessments with grassroots participation, revitalising public spaces and institutionalising resilience thinking.

6. Challenges and discussion

The design initiatives discussed above, notably the renovation plans for the park, demonstrate progress towards the project's expected outcomes. However, the implementation phase exposed structural and contextual challenges, particularly in carrying through an integrated approach to activities and tailoring design to Naryn's unique socio-cultural and environmental conditions. An

intractable obstacle emerged in the reluctance of key governmental actors to engage in capacity-building initiatives, which were often dismissed as resource-intensive and offering limited short-term gains. This resistance was exacerbated by a prevailing emphasis on high-cost, infrastructural "legacy" projects that diverged from the programme's resilience-oriented goals. In response, the programme adopted an adaptive delivery model – modifying content, reducing the duration of training modules, and emphasising early demonstrable impacts – to better align with local priorities. These measures were consistent with Transition Design principles, particularly those advocating systemic, long-term thinking and multi-actor co-creation. This necessitated localised adaptation of Western design methodologies, which are often inadequate for addressing contextual issues and variances in developing economies.

Moreover, the programme had to contend with a tendency among city officials viewing the initiative primarily as a funding mechanism for infrastructure projects, often overlooking its relevance to resilience. This caused a broader tension between top-down planning preferences and community-driven priorities. To address this, the programme developed an evidence-based evaluation tool for project selection, thereby reinforcing the importance of resilience-informed planning. This approach resonated with the discussion of applying acupuncture urbanism and nature-based solutions to generate sustainable, small-scale interventions, such as "pocket parks" and the Panoramic View in Tosh Bulak, to balance community aspirations with strategic goals.

Ultimately, the programme's success lay in fostering a participatory model for urban resilience that integrated local knowledge, institutional collaboration, and nature-inspired strategies. By grounding interventions in a contextually relevant, inclusive framework, NURP aligned with broader theoretical critiques of development paradigms, such as those proposed by Escobar's pluriverse and Irwin's Transition Design, advocating for dismantling hierarchical planning structures and embracing collaborative, systems-based approaches. The programme's outcomes demonstrated how integrating these principles into practice can transform urban spaces and governance, supporting sustainable and inclusive development in high-risk mountain settlements like Naryn.

7. Conclusion

A key insight from implementing the Naryn Urban Resilience Programme (NURP) is the imperative to move beyond rigid, externally imposed planning paradigms toward inclusive, context-sensitive strategies. Combining the Transition Design, systems thinking, and urban nexus methodological principles, NURP envisioned and implemented dialogic co-creation and small-scale interventions and made headway in navigating between local aspirations and strategic resilience goals. This adaptive, human-centric approach reframed urban space as a platform for socio-economic and environmental transformation.

Along the way, the persistent tensions across conflicting interests – such as the entrenched preference among governmental actors for symbolic, capital-intensive infrastructure – exposed the limitations of applying universal design frameworks without local adaptation. The use of evidence-based tools helped to recalibrate these priorities, but also underscored the need for more flexible, culturally responsive planning instruments.

Ultimately, the project demonstrated that urban resilience in provincial, post-socialist contexts requires more than technical solutions; it hinges on shifting institutional mindsets, fostering participatory governance, and embedding design thinking in local socio-political realities. These findings highlight the critical importance of place-sensitive, post-colonial frameworks for sustainable transformation, offering insights relevant not only for Naryn, but for other marginalised, climate-vulnerable regions confronting similar development constraints.

8. List of abbreviations

AKDN	Aga Khan Development Network
CPUR	Certified Programme on Urban Resilience
EI	Environment Index
IHA	Integrated Habitat Assessment
HVRA	Hazard Vulnerability Risk Assessment
NBS	Nature-Based Solutions
NURP	Naryn Urban Resilience Programme
SECO	Swiss State Secretariat for Economic Affairs
SILK	Society for Innovations with Local Knowledge
UNHABITAT	The United Nations Human Settlements Programme

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a new frontier for design

New urban commoning through community co-design

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Abstract

This poster presents insights and reflections into an emergent co-design process on urban commoning in a novel experimental neighbourhood in Eindhoven that integrates social housing, mid-rent housing, and self-build housing to foster a diverse and cohesive community. In our research we consider commoning as a verb—an active process of sharing and caring—rather than a commons as a collective resource.

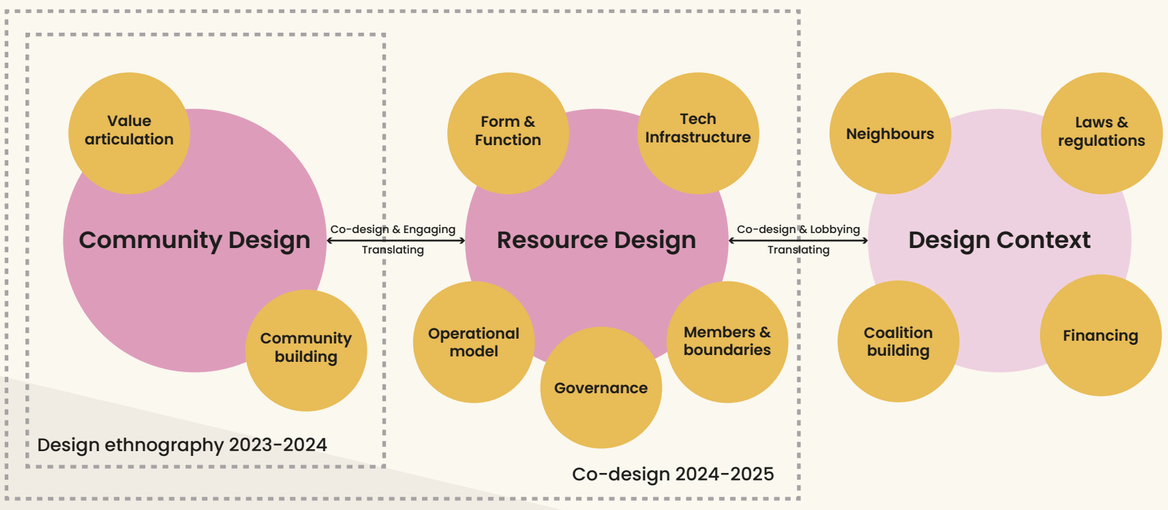
The co-design process started in 2023 and involves a close collaboration between academic design researchers and two designers-in-residence, who work together with residents, housing cooperatives, architects and the municipality to collectively give shape to the commoning process. Based on design ethnography and a series of interactive sessions, insights reveal that commoning is a polyvalent concept and that sharing and collectivity are already taking shape in various shapes and forms. Hence, in the design process we continue to build on existing networks and initiatives and facilitate the creation and strengthening of sharing and community building through a multi-modal ecosystem.

We critically examine the emergent methodology employed in this research and reflect how our research contributes to the broader debate on how participatory design can drive urban transformation, enabling resilient and inclusive communities through active engagement in the commoning process.

Research Objectives

1. To develop a **sharing community** [common] through co-design in the Buurtschap te Veld neighbourhood in Eindhoven
2. To develop a **scaleable co-design methodology** for co-designing new urban commons at neighbourhood level

Research Framework



2024-2025 Co-design

In the co-design process various tools and methods are adopted to explore and gradually design aspects of the future commons. Each tool addresses a selection and combination of aspects, aiming to translate and reiterate the articulated values and the community building activitities with the emergent co-design of the common. For every iteration the appropriate tools and methods are situationaly designed, applied and reflected upon in co-creation with the residents.

Methods & Tools

Asset mapping

Asset-mapping was conducted as a continuous exercise to map out what skills, items, services and knowledge available in the community that people are willing to share, as well as how they are spread over the neighbourhood clusters. This analogous map will be digitalized and made interactive and form a basis for a future sharing system.

SIM workshops

The SIM [Structured Interview Matrix] workshop was conducted to setup a dialogue among residents on the needs and limits of sharing in the community. Beyond the optimism on sharing, clearly a range of situations and things are considered odd, unsuitable or conditional.

Canvas sessions

Canvas sessions were facilitated to draw the possible systems, including player conditions, rules-of-the-game and places/platforms. A series of ‘items’ such as eggs, garden tools and a movie night were brought to table for residents to imagine possible systems for sharing.

Tastings

Residents will organize a series of ‘tastings’ to practice and test various forms of sharing among residents. The tastings are meant to enact and strengthen modes of sharing and ignite connections.

2023-2024 Design ethnography

Methods & Tools

Data collection was conducted between October 2023 and June 2024. Among the data collection methods are participatory observations, numerous conversations with residents, informal interviews with representatives of different committees and the neighbourhood council, a resident survey and analysis of digital communication channels.

Insights

1. The possibility and idea of sharing are important to many residents of Buurtschap te Veld. **Not only for practical reasons**, such as saving money or convenience, but also to make new social contacts and for sustainability reasons.
2. Although the concept of sharing has many different meanings, ranging from items such as tools or children's clothing and plants, to workshops where knowledge is shared, in all cases the '**getting to know each other**' among residents **forms the basis** for accessible sharing of items or knowledge.
3. It is believed that sharing occurs more naturally when there is **mutual trust and familiarity** between people.

Take aways

- Foster the creation of trust and familiarity among residents and stakeholders
- Make sure that all stakeholders are continuously involved and engaged throughout the process
- Engage a broader span of residents from different clusters/chambers in the community
- Expand on - or connect with – sharing networks and systems that are already in place.
- Put active and commitment residents in the driving seat
- Elaborate on what and how residents want to share, and under which conditions

Process: based on the Becommoning Design Framework (Tomorz & De Waal, 2023)

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POST-DISASTER DESIGN: THE ROLE OF DIGITAL FABRICATION IN URGENT ENVIRONMENTAL AND SOCIAL CONTEXTS

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ABSTRACT | The paper explores the development of CNC-fabricated modular MDF furniture designed to support adults, children and animals (pets) during emergencies. This response is driven by the growing frequency of climate-related disasters worldwide, as exemplified by the 2024 floods in Rio Grande do Sul, southern Brazil. These pieces of furniture were designed as a flat-pack solution, incorporating snap-fit joints and a dot-based assembly system for easy assembly and disassembly. They illustrate the relationship between material efficiency, digital fabrication, and urgent environmental and social contexts, aligning with the 'Regenerative City and Territorial Development' track by promoting resilient solutions for immediate post-disaster needs while enhancing ecological and social co-evolution. The paper's objective is to provide both theoretical and practical insights into how design and digital fabrication can assist affected communities in post-disaster environments. The methodology followed five key steps: (1) contextual analysis, (2) material and fabrication selection with open-source accessibility, (3) design development, (4) prototype iteration, and (5) final design. It began by examining the flood-affected areas to assess the current situation, the needs of adults, children and pets, and the availability of resources and fabrication methods. During the prototyping phase, various designs, materials and snap-fit joints were tested to optimize efficiency. In the final phase, design and details were refined. The concept of an "evolving project" is essential in disaster recovery as the needs of affected communities change over time. Consequently, two versions of the modular furniture were designed to accommodate these transitions: a

simplified version for the emergency phase (a bed without a headboard, transformable into a center table and an armchair) and a more complete version for the social reconstruction phase (a bed with a headboard, transformable into two armchairs). The simplified version is cost-effective, using just one MDF board, while the more comprehensive version offers added comfort, using one and one third boards. The results of the modular furniture offer significant advantages, especially in emergencies when time and resources are limited. The use of MDF and CNC fabrication allows for quick production, snap-fit joints and the dot-based assembly system ensures easy assembly and disassembly without screws, tools or literacy. The modular approach provides adaptable, affordable and efficient solutions, meeting both immediate and long-term needs for displaced humans and nonhumans. This design demonstrates the potential of modular furniture in disaster recovery, addressing both physical needs and emotional support to enhance well-being. Although this project was developed for Brazil, its use of simple, widely available materials, digital fabrication and the open-source project make it globally applicable. It serves as a model for future disaster responses, especially as climate-related natural disasters become more frequent. By focusing on inclusive design and multispecies needs, the paper examines how combining digital fabrication with environmental and social considerations can aid both immediate and long-term recovery efforts, offering effective solutions for the harsh conditions faced by displaced adults, children and pets worldwide.

KEYWORDS | DIGITAL FABRICATION, POST-DISASTER DESIGN, MULTISPECIES DESIGN, CNC-FABRICATED SNAP-FIT JOINTS, MODULAR FURNITURE

1. Introduction

The paper aligns with Track 04: Regenerative City and Territorial Development by exploring how design can help meet the urgent needs of both humans and animals after natural disasters, with a particular focus on modular furniture solutions fabricated using CNC technology for post-disaster environments. By integrating principles of regenerative design (Wahl, 2016), circular design (Ellen MacArthur Foundation, 2015), inclusive design (Krishnamurthy, 2019; Maisel et al., 2017) and multispecies design (Gatto & McCardle, 2019; Giaccardi & Redström, 2020), the paper highlights how digital fabrication, material availability and efficiency, along with consideration for animals (pets) and children, can promote ecological restoration and social co-evolution. Motivated by the increasing frequency of climate-related disasters worldwide, as exemplified by the 2024 floods in Rio Grande do Sul, southern Brazil, the research emphasizes the need for adaptable, resilient and cost-effective solutions that can meet immediate needs while supporting long-term recovery for displaced communities.

Regenerative design principles guided the project in creating systems that restore and renew natural and social environments, rather than merely mitigating damage (Wahl, 2016). The modular furniture design incorporates resource availability and efficiency through the use of MDF, a widely accessible and affordable material in many regions. Given MDF's affordability, availability, and scalability, it is a pragmatic choice for emergency solutions, particularly where cost and access to materials are crucial. MDF can be made with recycled and renewable materials, such as eucalyptus, and now some factories worldwide have developed technologies to recover MDF (Medium-Density Fiberboard) and HDF (High-Density Fiberboard) fibers for reuse (Unilin Panels, n.d.).

Rio Grande do Sul, in particular, is an important industrial hub in Brazil, home to 18,000 furniture factories that use MDF as their primary material (MOVERGS, n.d.). As a result, the state is also a major producer of MDF, ensuring its widespread availability. The MDF industry in Rio Grande do

Sul primarily relies on wood from reforestation efforts and is gradually incorporating recycled materials as sustainability practices evolve. The accessibility of MDF in the state, along with its extensive network of furniture factories, facilitates local production, promotes community self-sufficiency and resilience, and enables rapid deployment in post-disaster contexts.

In post-disaster scenarios, standard military field beds are often deployed due to their rapid assembly by volunteers, typically within seconds (Chad, 2023). In contrast, the proposed MDF modular furniture is comparatively heavier, features defined edges, requires a flat surface for stability, and involves a longer assembly and disassembly process—particularly challenging during the initial phase of crisis when individuals may be physically and emotionally overwhelmed. Nevertheless, while military field beds offer speed and practicality, they are frequently in limited supply, lack adaptability for longer-term recovery phases, and fail to address the emotional and multispecies needs of displaced populations.

Rio Grande do Sul is also a key hub for digital fabrication and CNC technology in Brazil, playing a vital role in driving innovation within the furniture manufacturing sector (Schreiber et al., 2024). The state's extensive use of CNC machines enables precise cutting, shaping, and material customization, enhancing production efficiency and minimizing waste and time (Kurmapu & Mishra, 2023). These modular pieces of furniture were designed as a flat-pack solution, allowing them to become completely flat for transportation and storage. By leveraging digital fabrication techniques, the project utilizes local manufacturing infrastructure to create adaptable, quick-to-cut and reusable modular furniture solutions.

Inclusive design principles (Krishnamurthy, 2019; Maisel et al., 2017) and multispecies design principles (Gatto & McCardle, 2019; Giaccardi & Redström, 2020) were embedded in the project to ensure that the modular furniture addressed the diverse needs of affected populations, both human and nonhuman. The pieces of furniture were CNC-fabricated with snap-fit joints, allowing for easy assembly and disassembly without screws or tools, and ensuring accessibility for users with varying physical and technical skills. In the dot-based assembly system, each joint features a specific number of dots that must be matched with the corresponding piece, similar to a children's game. This design guarantees that individuals without reading skills or formal education can assemble the pieces. Furthermore, the design also considers the cohabitation of adults, children, and animals (pets) in post-disaster settings, recognizing the importance of multispecies well-being in emergency responses.

Beyond its physical utility, the project contributes pedagogically through a "learning by doing" approach, enabling displaced individuals to participate in the construction of their own temporary environments. This method is rooted in experiential learning theories developed by John Dewey, Paulo Freire and David Kolb, who emphasized the transformative power of active engagement. Dewey (1938) argued that meaningful learning arises through direct interaction with the world, proposing that education should emerge from lived experience. Freire (1970) highlighted the emancipatory potential of participatory action, particularly for vulnerable and marginalized communities, asserting that knowledge is co-created through critical dialogue and reflection. Building on these foundations, Kolb (1984) developed the experiential learning cycle—a model composed of concrete experience, reflective observation, abstract conceptualization and active experimentation.

In this context, the act of assembling modular furniture becomes more than a practical necessity—it becomes a participatory act of recovery, fostering resilience, restoring agency and enabling emotional reengagement with one’s surroundings. The project also highlights the potential of open-source digital fabrication not only as a method for rapid, cost-effective production but as a means of democratizing access to design solutions. By promoting accessible, scalable and replicable systems, it offers dignified, adaptable and inclusive alternatives that respond to evolving post-disaster needs.

The concept of an “evolving project,” which incorporates multiple configurations—a simplified version for the emergency phase (a bed without a headboard, transformable into a center table and an armchair) and a more complete version for the social reconstruction phase (a bed with a headboard, transformable into two armchairs)—promotes inclusivity by accommodating the

varying priorities and constraints of both humans and nonhumans. Additionally, it optimizes resource use: the simplified version is cost-effective, requiring only one MDF board, while the more comprehensive version offers added comfort, using one and one-third boards. All of these methods align with regenerative design principles, meeting immediate needs while promoting long-term environmental and social well-being.

The results highlight how the CNC-fabricated modular MDF furniture can serve as a model for equitable territorial development by integrating environmental, social and technological considerations. While the project focuses on Brazil, its methodology and outcomes have global applicability, offering a model for aiding in confronting the challenges of climate change and promoting regenerative strategies for urban and territorial development.

2. Methodological Background: Rethinking Agency Beyond Anthropocentrism

Since the early 1980s, designers have used the concept of sustainability to address issues arising from the environmental crisis. While this has led to the development of systemic design approaches and methods aimed at reducing human impact on the planet, there has been little exploration of sustainability as a concept that goes beyond anthropocentrism (Gatto & McCardle, 2019). However, it is crucial to shift this view, which prioritizes human life, to a biocentric view that values all biological life, and ultimately, to an ecocentric view that recognizes the intrinsic value of the entire environment (Filho, 2023).

According to Forlano (2017), technological advancements are increasingly dissolving the traditional boundaries between nature and the artificial, human and animal, and human and machine. These developments highlight the emerging forms of agency of nonhumans in the world, whether in environmental or technological contexts. A growing body of social theory has emerged around concepts designed to understand this blurring of boundaries and to introduce hybrid, non-dual and relational ways of thinking.

The human-centered design methodology is a practice in which designers focus on human needs (Norman, 2013). Nevertheless, humankind is just one of many variables that shape our environments, and its agency is shaped through relational processes rather than being predetermined. As design shifts into the social sector and engages with complex socio-technical issues, it is essential to adopt a broader approach, such as posthuman design, which considers both human and nonhuman actors. Post-humanist and post-anthropocentric perspectives suggest that manufactured systems should be viewed as networks comprising diverse living beings and their relational dynamics in order to better understand planetary transitions (Gatto & McCardle, 2019). One area for exploration is rethinking humanity's relationship with other species and the environment, and proposing future scenarios for multispecies coexistence.

The term "multispecies" was introduced over a decade ago in the fields of biology and ecological sciences to describe the patterns of co-construction in environmental niches and wildlife management (De Ruiter et al., 2005). Its relatively recent inclusion in anthropology has led to new interpretations of the concept, enabling a reevaluation of how nonhuman agents engage with design and related processes. It also broadens the definition of sustainability, as considering environmental issues from nonhuman perspectives can result in outcomes that differ from those predicted by technocentric approaches. To engage with multispecies worlds and better understand environmental issues, designers must familiarize themselves with a variety of techniques that are not only procedural but also represent distinct ways of thinking, behaving and experiencing (Gatto & McCardle, 2019).

This paper shifts the focus from human-centered design to posthuman design, presenting a multispecies interpretation of the environmental contamination that includes both human and

nonhuman (animal) actors. It examines how designers can incorporate a multispecies approach to deepen our understanding of the agencies, dependencies and entanglements that emerge from contemporary design challenges (Forlano, 2017). This approach moves beyond anthropocentrism toward biocentrism, offering a posthuman perspective on the concept of the "user." It underscores the growing discourse of posthumanism and advocates for the inclusion of nonhuman lifeforms as active partners in design research—whether as informants, co-designers, or users. This inclusive approach addresses the needs not only of adults and children, but also of animals (pets) that have lost their homes and, consequently, their physical and emotional well-being.

3. Methodology

The paper explores the pressing challenges posed by climate emergencies, focusing on solutions that mitigate risks and provide rapid, effective support for affected populations, both human and nonhuman. Using the 2024 floods in Rio Grande do Sul, Brazil, as a case study, this project integrates a theoretical approach with practical prototyping to develop adaptable, user-centered furniture for post-disaster recovery. The methodology is outlined below.

3.1. Contextual Analysis: Climate Change and the Floods in Rio Grande do Sul

Between April and May of 2024, the state of Rio Grande do Sul experienced the second largest flood in its history. Intense and persistent rainfall over a span of just a few weeks severely impacted the valleys of the Taquari, Cai, Sinos and Antas rivers, along with the Serra Gaúcha and the Metropolitan Region of Porto Alegre. The torrential rains submerged urban areas, triggered landslides, and disrupted cities connections, leaving almost 90% of the state's municipalities with their urban infrastructure damaged. The effects were far-reaching: 497cities were affected, covering 15,778 km² of land. The floods resulted in the tragic loss of 181 lives, while over 2.3 million people were affected, with 580,000 displaced from their homes (ACNUR, 2024).

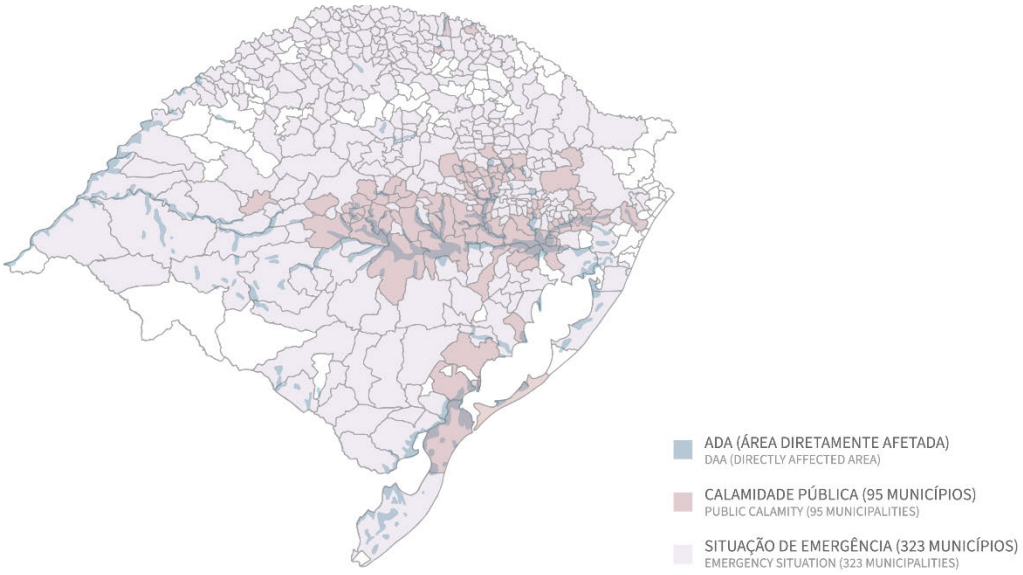

Figure 1. Map of the directly affected area (ADA) and municipalities impacted in the state of Rio Grande do Sul, based on: https://issuu.com/gauchazh/docs/avalia_o_dos_efeitos_e_impactos_das_inunda_es_no

A report by the World Weather Attribution (2024) highlights that part of the intensification of this phenomenon is linked to the influence of El Niño-Southern Oscillation (ENSO), which exacerbated the rainfall. While El Niño played a significant role, it must not be viewed in isolation; as a climatic phenomenon, it also responds to the alterations brought by climate change, which imposes a new rhythm to increasingly extreme events. The report concludes, "... climate change has doubled the probability of such events occurring and increased their intensity by 6-9%. For future projections, with a 2°C global temperature rise relative to the pre-industrial period, the probability of such events occurring would be once every 20-30 years, with a 4% increase in intensity compared to today" (Oliveira, 2024).

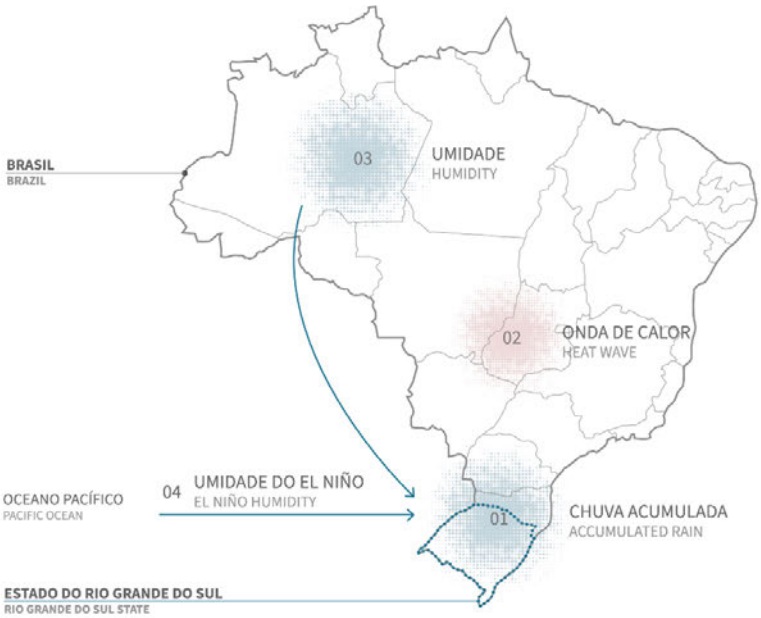

Figure 2. Map illustrating the combination of factors that led to the torrential rains in Rio Grande do Sul, based on: https://www.bbc.com/portuguese/articles/c90zxeqj342o

The intense rainfall in May 2024 that struck the state of Rio Grande do Sul caused the level of Lake Guaíba, in the metropolitan region of Porto Alegre, to increase to 5.35 meters, exceeding the flood threshold of 3 meters by 2.35 meters. This record-breaking rise left thousands of homes submerged across various neighborhoods in the capital and surrounding municipalities. The rapid elevation of the waters forced residents to evacuate their homes, taking only essential items, such as documents and a few pieces of clothing, while the majority of their belongings were left behind. The muddy and contaminated floodwaters that entered the homes caused widespread destruction, damaging furniture, appliances and other personal belongings. Upon returning to their homes after the waters receded, many residents faced scenes of devastation. For those whose homes remained standing, the difficult task of discarding almost everything affected by the flood awaited them, as the items were irreparably damaged due to contamination and prolonged exposure to water (Laboissière, 2024)

In this disaster, approximately 81,170 individuals sought refuge in 722 temporary shelters, which included schools, gymnasiums, churches and other public spaces adapted for emergency accommodation. Although initially conceived as a temporary solution, this measure, in many cases, extended for months. Currently, ten months after the event, around 950 people still remain in these improvised spaces (Secretaria de Desenvolvimento Social/RS, 2024). The setup of these shelters occurred rapidly and with limited resources. Emergency measures, such as mattresses placed on gymnasium floors and makeshift partitions, were common, as the displaced individuals sought ways to secure a minimum level of privacy (Pontes, 2024).

Figure 3. Photo by Diego Vara showing the flooded streets of Porto Alegre, Rio Grande do Sul (RS), https://g1.globo.com/rs/rio-grande-do-sul/noticia/2024/05/06/temporais-no-rs-veja-resgates-impressionantes-durante-as-chuvas.ghtml

Figure 4. Photo by William Fernando Marx Purper, showing the houses destroyed after the torrential rains, generously donated by the photographer.

It is essential to highlight that children are among the most vulnerable groups within displaced populations. A UNICEF report (2023) reveals an alarming statistic: between 2016 and 2021, approximately 47 million children were displaced worldwide, equivalent to

around 20,000 displacements per day. The impacts of this phenomenon are profound, as it not only disrupts their access to education, healthcare, and basic necessities but also increases their exposure to risks such as trafficking, exploitation, and abuse. Furthermore, the disruption of community and family ties intensifies these vulnerabilities, placing children in a cycle of displacement that compromises their long-term safety and well-being.
During the floods in Rio Grande do Sul, children accounted for approximately 25% of the population in temporary shelters.

Figure 5. Photo by Diego Vara showing adults and children from flooded areas taking shelter in a gym in Porto Alegre, RS, May 2024, https://www.reuters.com/world/americas/brazil-flooding-forces-plan-tent-cities-house-displaced-2024-05-16

In addition to the shelters provided for displaced people, animals were also accommodated in temporary facilities. During the disaster period, approximately 11,002 animals were temporarily sheltered with the aim of reuniting them with their owners, highlighting the emotional significance of human-animal bonds in the recovery process (Rodrigues, 2024). Mainly, these shelters for cats and dogs where made of pallets and covered with plastics, which brings issues related to their durability, security and hygiene. For example, pallet wood can accumulate dirt, feces and moisture, creating an ideal environment for fungi and bacteria to thrive, which can be harmful to the animals. Additionally, pallets may be unstable or contain nails and splinters that pose risks to them.

Figure 6. Photo by Rafa Neddermeyer of an animal shelter and another photo by Renan Mattos of a dog sleeping in a human shelter. First photo: https://agenciabrasil.ebc.com.br/geral/noticia/2024-05/animais-domesticos-continuam-sendo-resgatados-de-areas-alagadas-no-rs and second photo: https://images.app.goo.gl/q2K8cjrbnhyvYDxy9

In conclusion, emergency furniture needed to be designed that could initially function as beds for humans, keeping their mattresses off the ground, and also include storage for their belongings, as well as small spaces for pets (dogs and cats). After the initial emergency phase, the furniture could evolve and transform into other pieces suitable for both humans and animals.

3.2. Material and Fabrication Selection with Open-Source Accessibility

The region's furniture production activity influenced the material selection, with MDF panels identified as a readily available, low-cost, and scalable option. The abundance of MDF in Rio Grande do Sul, driven by the local industry, was a key factor. Initially, a combination of MDF and truck canvas was considered for added comfort, with the canvas used for soft parts in contact with the body. However, the truck canvas was rejected due to inconsistent supply and the cleaning processes that would delay production. MDF panels were ultimately chosen for their accessibility, uniformity, and compatibility with digital fabrication technologies.

The material and fabrication selection not only suited the region's characteristics but also made the project adaptable to disaster-affected areas worldwide. Initially developed as an open-source initiative for southern Brazil, the project allowed anyone to access, modify and build their own version. However, due to the chosen material and fabrication method, its scope expanded beyond the region, leading to design modifications and translations of the basic instructions into English. This ensured the prototype can be reproduced using any fabrication facility or Fab Lab worldwide.

3.3. Design Development

Four main principles guided the design development of the modular piece of furniture. The first was the concept of an “evolving project,” which was essential for addressing the changing needs of displaced individuals throughout different stages of disaster recovery: (1) Phase 1 – Emergency Furniture – Functioning as beds to provide immediate relief and (2) Phase 2 – Social Reconstruction – Transforming into social furniture (armchairs and center tables) to help people rebuild social connections.

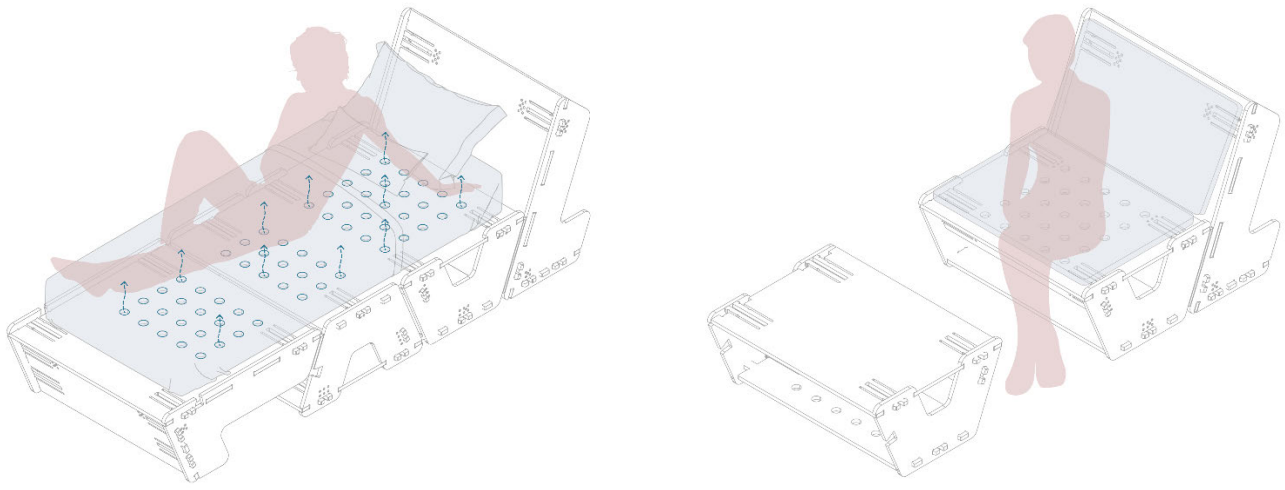

Figure 7. Diagrams of Phase 1 (bed) with ventilation holes for the mattress and Phase 2 (center table and armchair) with optional cushions.

Immediately after a disaster, priorities focus on survival, safety and basic necessities, requiring functional emergency solutions. However, as recovery progresses, the emphasis shifts toward rebuilding social structures and restoring a sense of normalcy. Designing modular furniture that adapts to these phases ensures that resources remain relevant beyond the initial crisis, providing long-term support for displaced individuals as they transition from emergency shelter to reconstructed communities. Thus, the design needed to prioritize multifunctionality, addressing not only physical comfort and practical needs but also emotional and psychological well-being at different stages of disaster recovery. This approach maximizes efficiency, minimizes waste and fosters resilience.

The second principle was inclusivity, taking into account the needs of both humans (adults and children) and animals (pets) during emergencies. An example of this is the inclusion of holes in the furniture that can serve as shelters for cats and dogs or as storage spaces. Other examples are presented in the Results section.

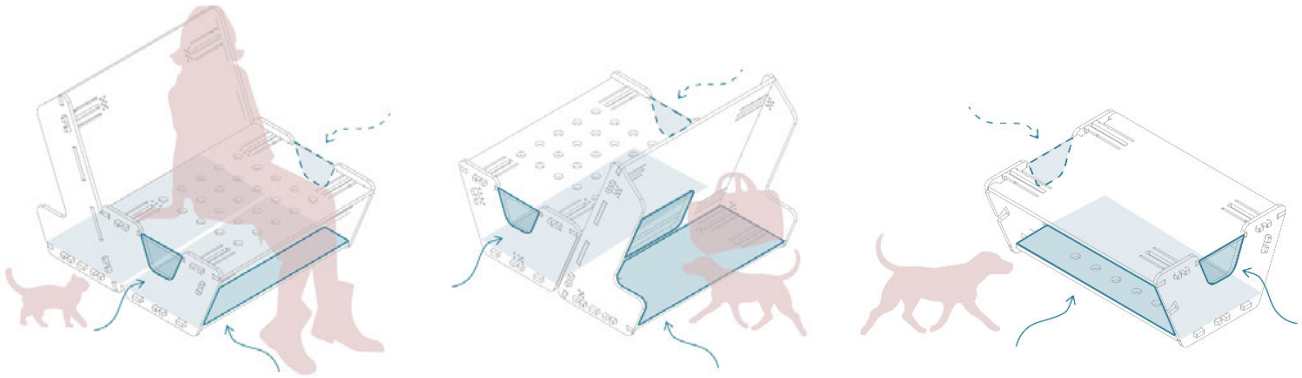

Figure 8. Diagrams of the armchair and table, featuring holes that function as shelters for cats and dogs or as storage spaces.

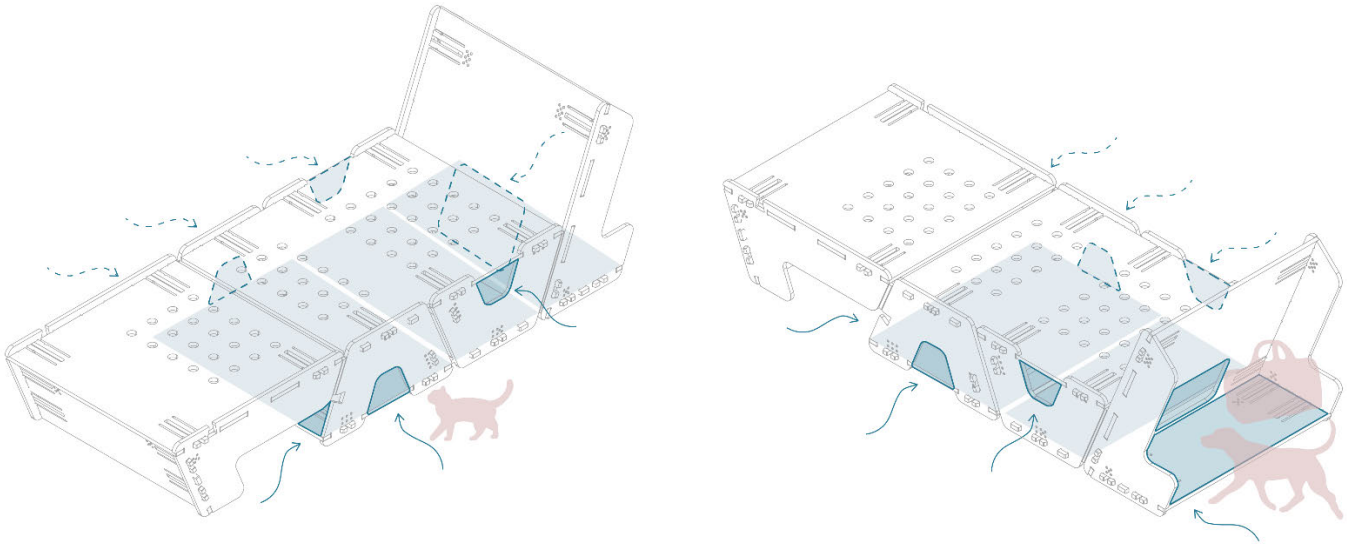

Figure 9. Diagrams of the bed featuring holes that function as shelters for cats and dogs or as storage spaces.

The third principle was that these modular pieces of furniture used only one material (15mm MDF) and were designed as a flat-pack solution, requiring no tools, screws or glue—an essential feature in emergencies when time and resources are limited. This design ensures ease of assembly, reassembly, storage, and transport. The pieces relied solely on CNC-fabricated snap-fit joints, which are commonly used in the industry for their simplicity, cost-effectiveness and efficiency in joining parts.

The fourth principle is that two versions were designed based on the availability of

resources: (1) a simplified version, using one MDF board to create a bed without a headboard, which can later be transformed into a center table and an armchair, and (2) a more comprehensive version, requiring one and one-third boards to create a bed with a headboard that later can be transformed into two armchairs. Thus, for three pieces of furniture, four whole boards are required. The simplified version is cost-effective, while the more comprehensive version provides greater comfort by using additional material.

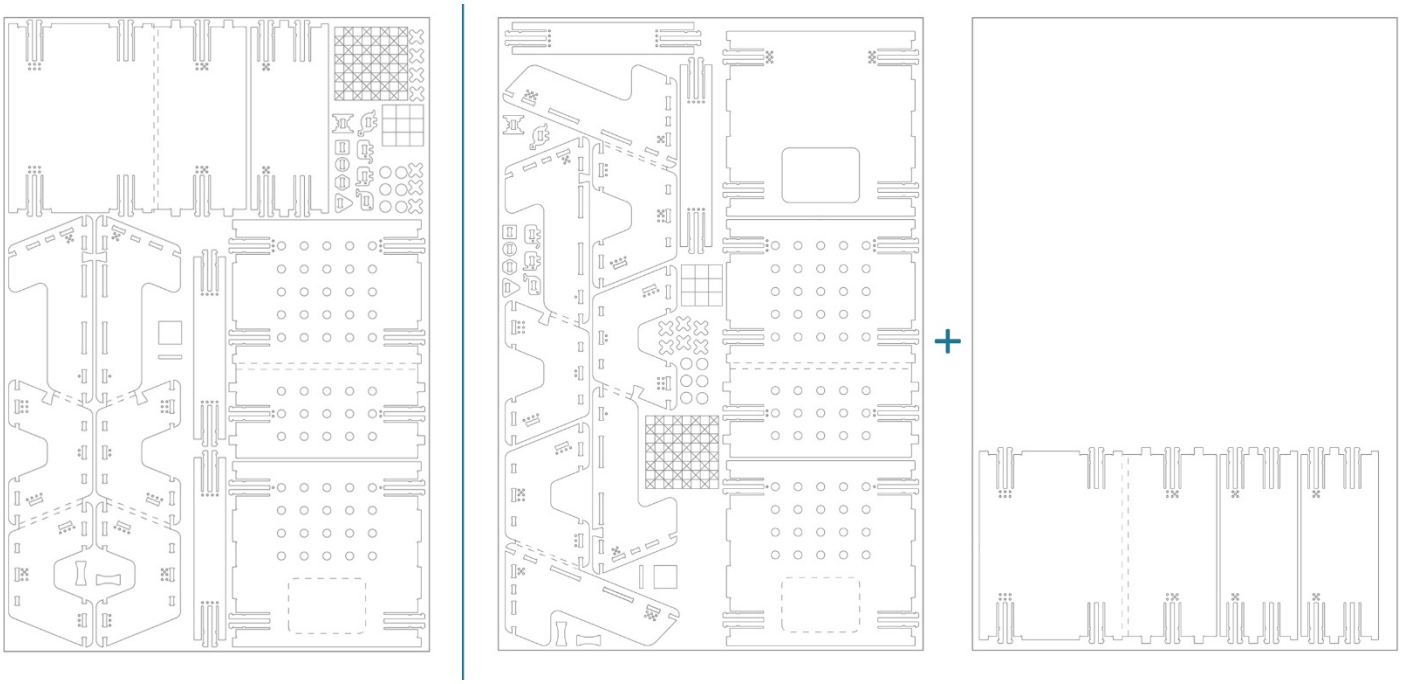

Figure 10. Drawings of the (1) simplified version using one MDF board and the (2) comprehensive version, requiring one and one-third boards.

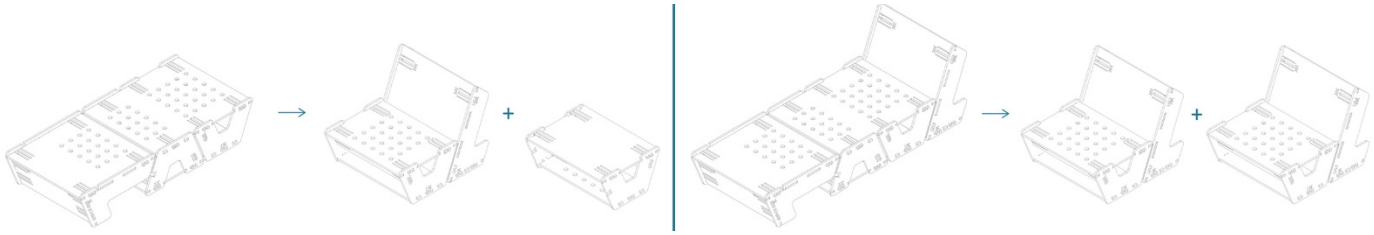

Figure 11. Drawings of the (1) simplified version and the (2) comprehensive version.

3.4. Prototype Iteration

A series of 1:5 scale models were created to anticipate potential challenges and facilitate iterative design adjustments, focusing on functionality, modularity and primary structural reliability. Different designs were tested to improve efficiency. Simultaneously, 1:1 scale tests were conducted to determine the correct fit for the joints, ensuring that each part connected easily, without being too tight or too loose. Three tests were performed with margin variations of 0.2, 0.3, and 0.5 mm to determine which margin provided the best fit. The 0.5 mm margin was incorporated into the design because it performed the best and can also accommodate potential variations in the 15mm MDF thickness from different suppliers. To address potential discrepancies in CNC machine tools across factories or Fab Labs in different countries, a test was included in the drawing to verify the fit before cutting all the pieces (see Figure 22). All these efforts ensured the integrity of the modular furniture's fabrication and assembly, guaranteeing consistency, universality and reproducibility worldwide.

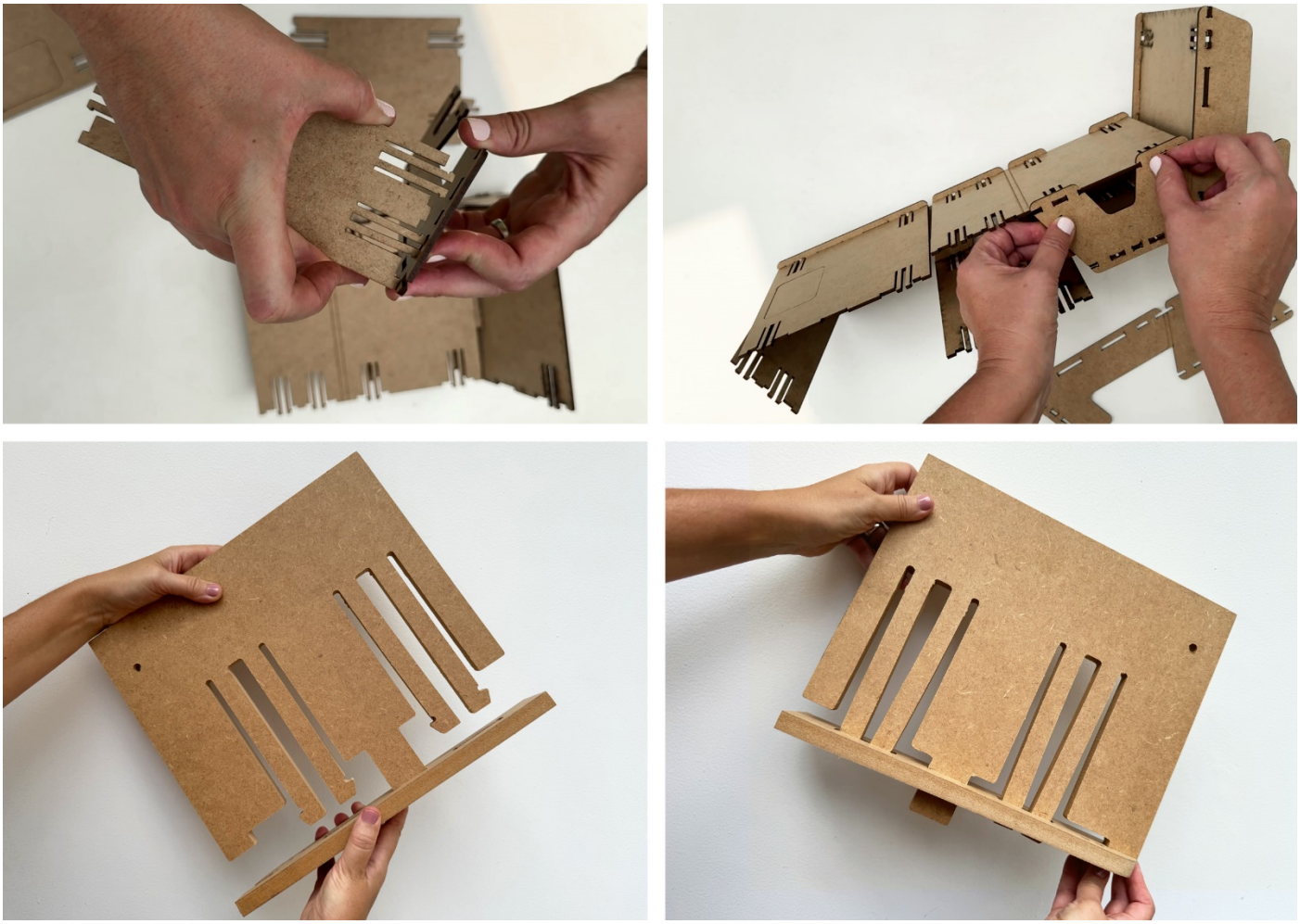

Figure 12. Photos of the 1:5 scale models and 1:1 scale tests.

3.5. Final Design

A full-scale prototype made from laminated 15mm MDF underwent physical testing to evaluate its performance, ease of assembly and structural reliability. Following this, details and dimensions were refined. In addition, during the final design phase, a comprehensive assembly manual containing diagrams was created to guide users on the simplest way to assemble and disassemble each module.

Figure 13. Photos by Flavio Sampaio showing the furniture assembly and testing process.

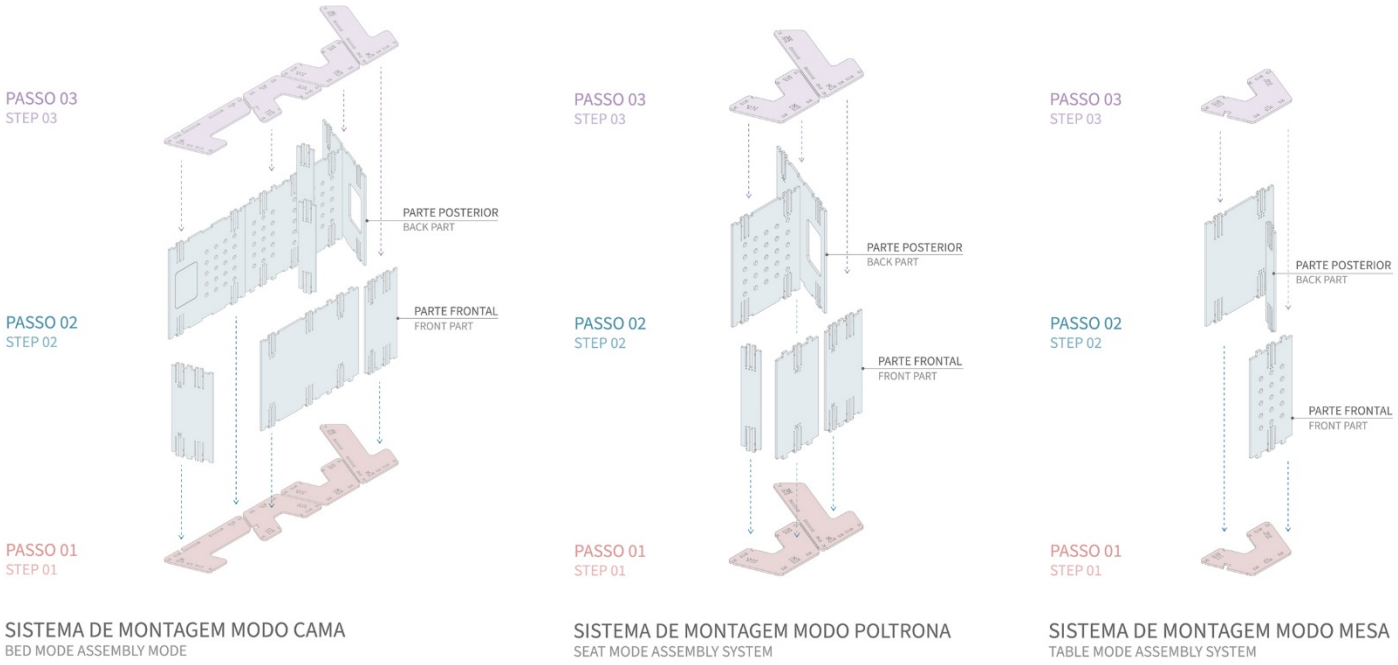

Figure 14. Examples of diagrams that guide users through the simplest way to assemble each module (bed, armchair, and center table).

4. Results

The results demonstrate the significant advantages of these modular furniture pieces, which are adaptable and can be transformed from single beds to armchairs and center tables.

Figure 15. Photo by Flavio Sampaio of the bed with the headboard.

Figure 16. Photo by Flavio Sampaio of the center table and armchair.

Figure 17. Photo by Flavio Sampaio of the disassembled pieces.

Figure 18. Flavio Sampaio capturing images of the pieces of furniture.

During the creation of this modular furniture, some insights emerged. One of them was the idea that, in the second phase, when the focus shifts toward rebuilding social structures (with beds transforming into armchairs and center tables), a game could be designed using materials that would otherwise be discarded, helping people gather and strengthen their bonds. Games are essential in fostering social connections and trust. They provide a space for collaboration and communication, and in times of crisis, they can help people reconnect, alleviate trauma, promote emotional well-being, and reinforce relationships, contributing to social cohesion (Sharma, 2019). In this context, the circles created for mattress ventilation were repurposed as pieces for games like tic-tac-toe and checkers. The empty spaces on the MDF board were also utilized to design new pieces and the bases for these games.

Figure 19. Photo by Flavio Sampaio of the tic-tac-toe and checkers game made from pieces that would otherwise be discarded and from the empty parts of the MDF board.

Another game, designed specifically for children, was also created. Children are especially affected by catastrophes, often experiencing trauma when displaced. They lose not only their homes but also their possessions, including toys, and may struggle to connect with their new environment (Osofsky & Osofsky, 2013). To make the modular furniture more inclusive and address the needs of this vulnerable group during disasters, its design was slightly modified to accommodate laminated MDF animals that children can use to play. These animals were designed to fit into the empty spaces of the MDF board and later be placed between the furniture joints, allowing children to engage with their environment in a constructive and comforting way. Although simple, these elements help children maintain a sense of normalcy, offering both entertainment and distraction, which are essential for their emotional recovery.

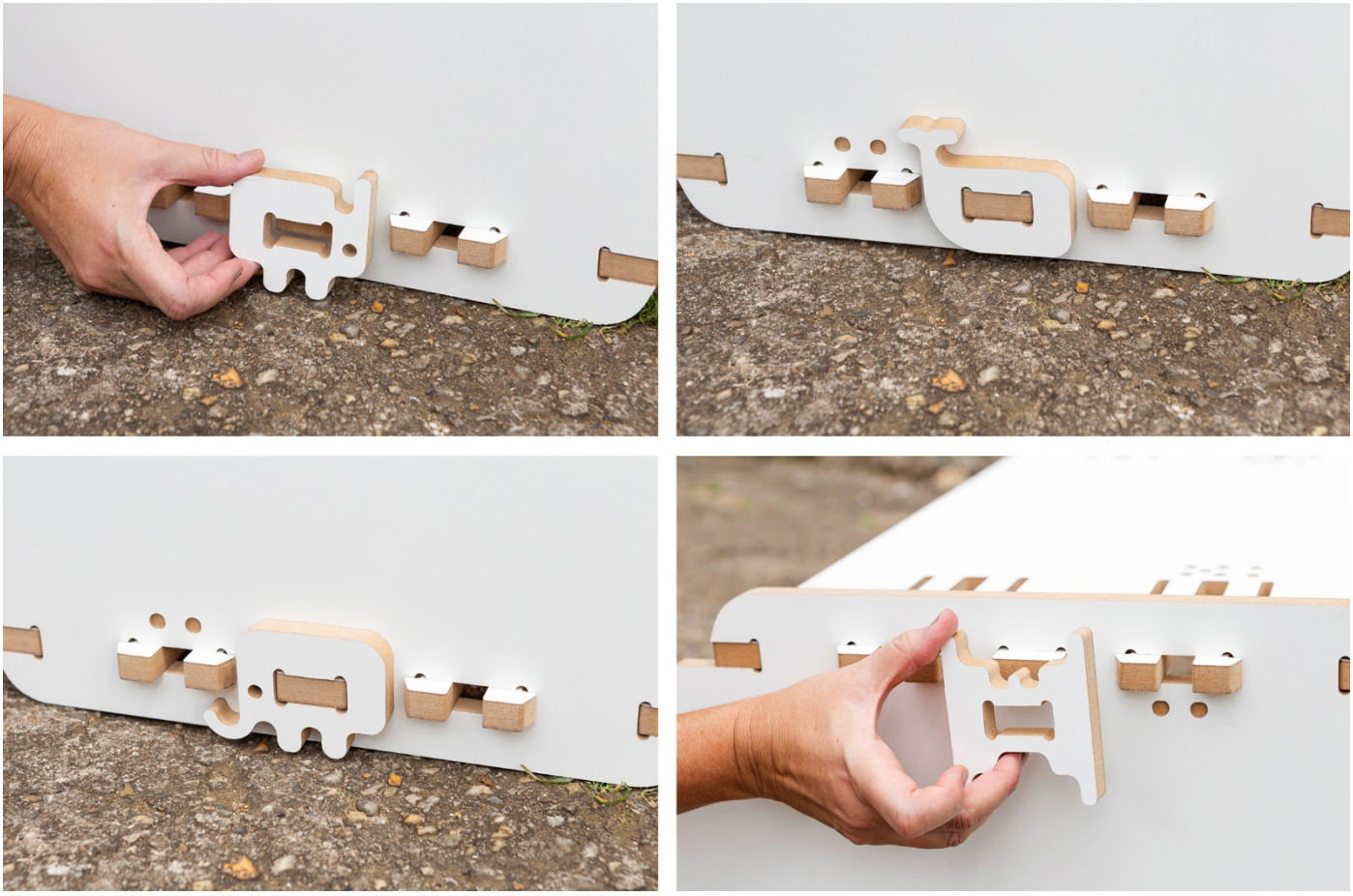

Figure 20. Photo by Flavio Sampaio of the piece of furniture being used as a game for children.

An additional insight was the creation of a dot-based assembly system that requires no prior knowledge. Each joint features a specific number of dots that must be matched with the corresponding piece, similar to a children's game. This system was developed to address the lack of formal education in many communities in Brazil, allowing individuals from diverse backgrounds, regardless of their education or cognitive abilities, to engage with and assemble the modular furniture independently.

The final insight concerns the snap-fit joints. These joints consist of a male and female component, with a cantilever hook that temporarily bends to allow the pieces to fit together, utilizing the material's elasticity. Once assembled, the pieces return to a stress-free state. The geometric design of the components determines the force required for assembly or disassembly, as well as whether the joint is separable (Robeller et al., 2014). During furniture assembly, it was observed that, due to the size of the furniture, the number of joints, and the need to simultaneously tension the cantilever hooks, the process

becomes easier if Hellermann cable ties or strong strings are used to hold the joints under tension. After assembly, these can be cut. This method simplifies the assembly process for two people without requiring significant physical strength.

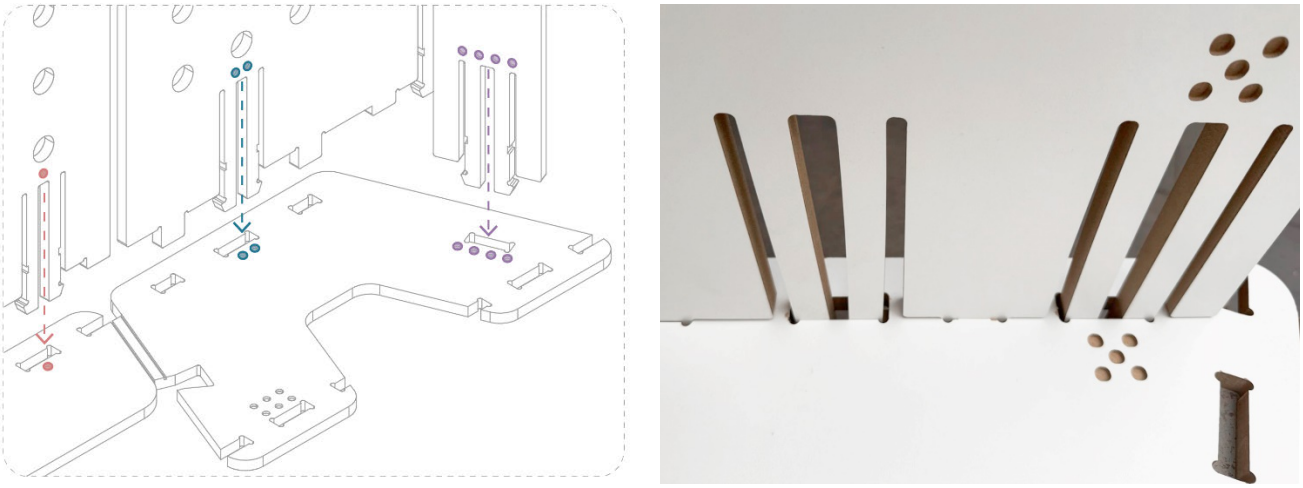

Figure 21. Diagram and photo of the dot-based assembly system.

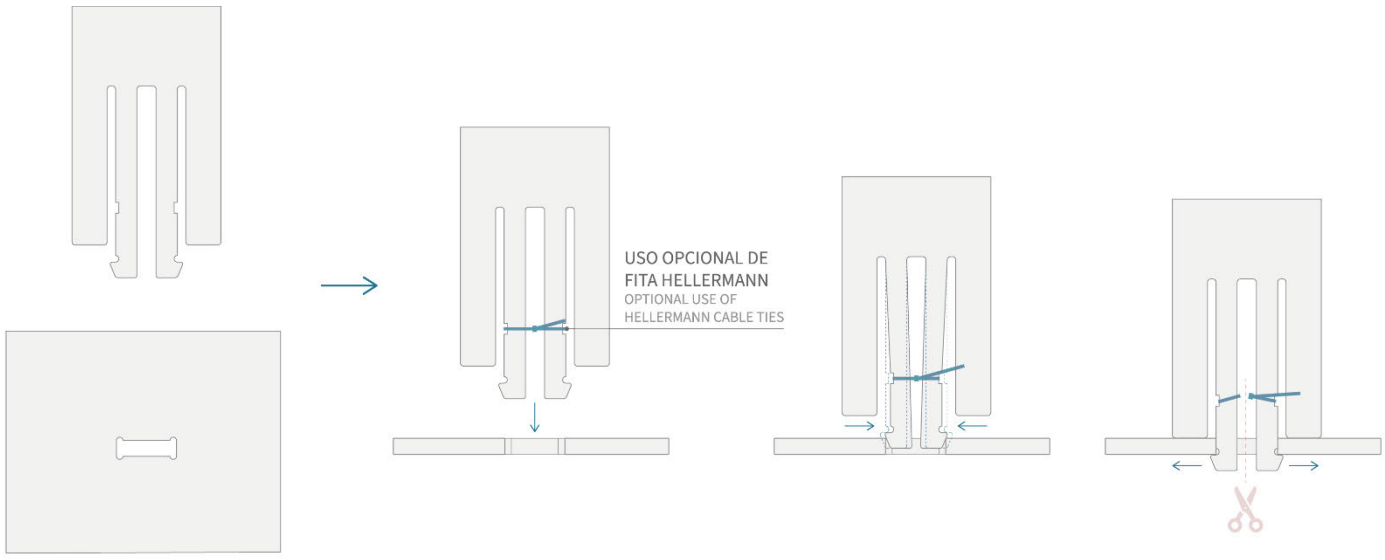

Figure 22. CNC-fabricated snap-fit joints with the option of using Hellermann cable ties or strong strings to facilitate assembly.

5. Discussion - From Local to Global: Addressing Displacement and Resilience Through Modular Furniture Design

The 2024 flood disaster in Rio Grande do Sul, Brazil, is part of a broader global trend in which climate change exacerbates the frequency and intensity of natural disasters. The consequences of these events are immeasurable, with millions of people worldwide being displaced from their homes as a result. The recurring disasters worldwide, year after year, place Brazil in a complex climate transformation scenario, gradually diminishing the exceptional nature of these events.

In the summer of 2021, Germany faced the worst flooding in decades, with the regions of Rhineland-Palatinate and North Rhine-Westphalia among the most affected. Torrential rains caused rivers to overflow and triggered landslides that buried homes and infrastructure, resulting in more than 180 deaths (BBC, 2021). In the United States, Hurricane Ida caused catastrophic flooding in Louisiana in 2021, affecting cities like New Orleans and forcing the evacuation of hundreds of thousands of people. The storm's remnants also triggered flooding in the northeastern part of the country, severely impacting New York and New Jersey (Santana & Reevesap, 2021). In September 2023, Libya was devastated by floods caused by Storm Daniel. The accumulated rainfall exceeded 400 mm in some regions, resulting in the collapse of two dams, and subjecting the city of Derna to the worst flood in its history. The disaster left approximately 6,000 people dead and displaced more than 40,000 (UNHCR, 2024). Monsoonal rains have also increased in intensity over the past few decades. In 2022, around 33 million people were displaced in Pakistan due to floods (UNHCR, 2022). Similarly, in June 2024, the Sylhet region in northeastern Bangladesh was affected by severe flooding, impacting more than 2 million people, including 772,000 children, and displacing 51,000 individuals who sought shelter in 1,685 relief centers (UNICEF, 2023a). All of these events, along with many others, highlight the increasing frequency and severity of floods in various contexts, emphasizing the urgent need for a response from both authorities and civil society to mitigate the impacts of climate change.

The perspective regarding the impact of climate change is tragic. According to a 2024 report by the UNHCR (2024), 90 million people live in countries exposed to high climate risks. In the last decade, climate-related disasters have caused around 220 million internal displacements, or approximately 60,000 displacements per day (IDMC, 2024). This scenario exposes the most critical and alarming aspect of the crisis, highlighting that climate emergencies are not merely environmental phenomena; rather, they ultimately reveal a humanitarian urgency.

In the glossary of the United Nations High Commissioner for Refugees -UNHCR report (2024), extreme climate events are classified into two categories: sudden-onset events and slow-onset events. Despite the evident cause-and-effect correlation between these two classifications, sudden-onset events require rapid responses, especially in the phase of sheltering affected populations. The sudden loss of assets, familiar environments and living conditions in such disasters often leaves individuals in shock and despair. Emergency measures are then needed, not only to ensure shelter and security but also to mitigate the psychological and social impacts. These impacts include the erosion of social bonds, displacement from homes, compromised access to essential services like healthcare and education, and separation from friends and pets. Thus, developing effective and adaptable solutions to meet both the immediate and long-term needs of displaced populations has become more urgent than ever.

Pets are often overlooked in disaster relief recovery plans, despite their crucial role in providing emotional support to displaced families. Studies show that Animal-Assisted Therapy (AAT) has been effective in treating Post-Traumatic Stress Disorder (PTSD). Research indicates that interaction with animals alleviates symptoms of anxiety, depression, and stress, while providing comfort and emotional stability. The presence of animals facilitates social reintegration and

promotes a sense of security (O'Haire, Guérin & Kirkham, 2015). Consequently, animals should be more systematically integrated into recovery plans, reflecting a biocentric perspective that acknowledges their significant role within human communities.

The modular MDF furniture project, originally conceived for Brazil, demonstrates its global applicability through the principles of modularity, material efficiency, and digital fabrication. It offers a viable solution for disaster relief, responding to the increasing frequency and severity of climate change-induced crises that exacerbate population vulnerability.

Figure 23. Photos showing the donated furniture and people interacting with it in Brazil.

3. Conclusion

The paper explores the creation of adaptable, effective, and affordable modular furniture to assist both humans and nonhumans during emergencies, particularly in response to the increasing frequency of climate-related disasters, as exemplified by the 2024 floods in Rio Grande do Sul, southern Brazil. The objective is to offer both theoretical and practical insights into how design and digital fabrication can aid affected communities in post-disaster environments.

The modular MDF furniture system, designed as a flat-pack solution for both emergency and social reconstruction phases, balances practicality, affordability and ease of assembly while supporting the emotional well-being of adults, children and animals. The use of snap-fit joints and a dot-based assembly system enables easy, tool-free assembly and disassembly, making it ideal for emergencies when resources and time are limited. MDF and CNC fabrication allows for quick production, transportation and storage. Two versions were developed: a simplified version for the emergency phase, using one MDF board, and a more comprehensive version for the recovery phase, using one and one-third boards. This project demonstrates the potential of scalable, open-source solutions in disaster response, illustrating how inclusive design and digital fabrication can meet both immediate and long-term needs, enhancing overall well-being.

The results demonstrate how MDF modular furniture, made from simple, widely available materials, can be quickly produced and deployed to aid displaced individuals across different geographical and cultural contexts. Although developed for Brazil, the use of open-source approach makes it applicable globally, offering a model for future disaster responses for both humans and nonhumans, particularly as climate-related natural

disasters increase. The significance of this research lies in its potential to inform future disaster relief strategies worldwide, emphasizing the need for inclusive design that considers the well-being of both humans and nonhumans in the aftermath of natural disasters.

Beyond its practical attributes, this research highlights the broader implications of design for emergency relief. By incorporating multispecies considerations, leveraging open-source methodologies, and utilizing digital fabrication, the project contributes to ongoing discussions in humanitarian design, environmental justice and community-driven resilience. It democratizes access to essential resources, particularly for vulnerable populations affected by climate change.

Despite its contributions, this research has some limitations. Prototype testing has not yet been carried out in diverse environmental and socio-cultural contexts, and long-term durability assessments are still pending. Further studies are needed to refine material selection and optimize structural performance over extended use. While MDF is cost-effective, its lack of water resistance is a notable limitation. Exploring alternative materials or protective finishes could improve durability, and considering region-specific materials would enhance adaptability. Additionally, while the design may provide emotional and psychological benefits for displaced populations, further empirical research is needed to confirm its long-term effectiveness in promoting well-being in post-disaster environments.

Building on these considerations, future research could begin by examining the long-term impact of the furniture on the emotional well-being of displaced individuals, particularly its role in fostering social networks and aiding community recovery. Complex games, beyond simple ones like tic-tac-toe and checkers, could be incorporated into the modular furniture and further investigated to help individuals access important information and aid in their recovery from traumatic experiences. Additionally, studies could explore advanced biomaterials and AI-driven design optimizations to enhance resilience and sustainability. Collaboration with NGOs, local governments and affected communities could provide critical insights for improving deployment strategies. Furthermore, investigating the integration of digital fabrication methods with local materials and craft traditions could offer valuable perspectives on hybrid design solutions that are both culturally appropriate and scalable.

Ultimately, the paper reinforces the role of design as a proactive tool in disaster response. By reimagining emergency furniture as an adaptable, inclusive and scalable system, it advocates for a paradigm shift in humanitarian aid—one that embraces open-source collaboration, affordable and accessible materials and fabrication strategies, and multispecies principles to foster more resilient futures.

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Prodotti Protetti(vi):

Recasting the EU's Geographical Indication Regime as a Framework for Regenerative Design in Rural Italy

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ABSTRACT | What roles might design play in developing more sustainable, contemporary ruralities? Can small towns and their traditional practices be preserved without compromising economic viability? These are the questions that form the foundation of this study abroad design-research studio based in Italy's Marche region and centered around placed-based food systems, also known as geographical indications. Through detailed and highly nuanced understandings of the processes, communities, and environments that make these EU-protected consumable goods unique, students in this course have been able to curate a set of protected and/or prized products ranging from cheese and wine to the elusive white truffle. Each of these *prodotti marchigiani*, with its unique spatial and programmatic needs, serves as a sort of "client" for a research-driven design project. In the course of this work, students explore questions of intangible heritage, regenerative agriculture, land management, ecological planning, adaptive reuse, multi-species design, refugee resettlement, and the impacts of tourism on small communities. By the end of the first iteration of this course in 2022, the studio had developed a set of product-centric, production-based transdisciplinary projects that together reveal the possibility of a more productive, livable, equitable, and sustainable future for the small cities, towns, and remote landscapes across the Marche region.

KEYWORDS | rural development, heritage, agroecology, transdisciplinary design

1. Introduction

The slow march of widespread population loss in the Italian countryside and the ensuing state-sponsored efforts to stave off the decline of rural towns and regions have been well documented in popular media over the past decade. Beyond flashy financial incentives and the doorbuster deals that made the One Euro Houses Project famous, Italy and much of the rest of Europe have had a system in place for more than 30 years to protect traditional life and commerce in the countryside: geographical indications (GI) (Bloom, 2022; Brancolini, 2021; Case a 1 Euro, n.d.). The European Union's GI regime is a legal framework adopted in 1992 to protect small-scale producers of heritage food and wine by certifying the production processes, quality controls, and geographic origins of specific products. Simply put, GI schemes grant small-to-medium-scale producers entry into the global food market by providing a substantial advantage over large-scale competitors through product differentiation (Crescenzi et al., 2022). That said, the GI regime is not only an economic bulwark against corporate consolidation and vertical integration typical of global agri-food markets. When considered through the lens of spatial planning, GI schemes can also serve as policy tools for fostering rural development, combating rural depopulation, preserving heritage landscapes, and ultimately developing more economically robust regions.

In recent years, researchers have begun to question the socioeconomic efficacy of these regulatory regimes that safeguard spatially embedded agricultural production and processing. Various analyses, both qualitative and quantitative, have demonstrated significant economic benefits for both individual producers as well as for GI-producing rural regions. Specifically, the data have shown increases in income, employment growth, and movement within local economies toward higher value-added sectors (Gerz & Dupont, 2006; Cei et al., 2018; Crescenzi et al., 2022). Even as this research may begin to reveal an economically viable agricultural alternative for rural inhabitants that enables differentiation without dispossession, individual GI schemes may still perpetuate social and environmental injustices, especially with regard to capital-labor relations and environmental stewardship (Norgaard & Collard, 2021). To that end, GI producers that already benefit from *de jure* institutional architectures at the supranational, national, and regional levels stand to benefit from greater care at the hyper-local level, at the scale of the space of production. This paper explores how transdisciplinary, systems-oriented design approaches (e.g., community-driven master planning, integrated operational facility architecture, contextually responsive programming, regenerative landscape management, and cooperative economics) could help reduce negative externalities associated with GI-producing enterprises while simultaneously improving their potential to sustain rural environments, economies, and communities.

It is precisely this hopeful yet cautious perspective of the EU's GI schemes that has provided a critical and theoretical foundation for a speculative, design-research architecture studio based in the heart of Italy's mostly rural Marche region. When considered through the lens of the architectural design studio, GI schemes with their prescriptive production processes offer students a unique opportunity to engage with ecological and economic systems thinking as a prerequisite to designing more holistic facilities, landscapes, and cultural centers associated with the production and enjoyment of heritage foods and wine. This design-research studio was first launched in the fall of 2022 when Wentworth Institute of Technology launched its study abroad program in Urbino, a Renaissance-era walled city nestled among the Apennine mountains of central Italy. Urbino is an undeniably rich environment for the study of architecture. It is the birthplace of the painter and architect Raphael and home to early and influential perspectival paintings such as the *Ideal City* (c. 1480-1490) and Piero della Francesca's *Flagellation of Christ* (c. 1455–1460). The city is the site of multiple built works by the mid-century modern architect Giancarlo de Carlo while also a paradigm of historic preservation, restoration, and reuse thanks to its designation as a UNESCO World Heritage site. Despite all this, the Marche remains a relatively undiscovered region that suffers from economic stagnation and decline, especially when compared to its neighbors, Tuscany and Emilia-Romagna (Blim & Goffi, 2018). This design-research studio, titled Prodotti Protetti(vi) and translated either as "Protected Products" or "Protective Products," posits that GIs and the design of their production spaces—if considered through a more holistic, systems-based, and ecological lens—could play a key role in protecting the small, rural communities that have preserved these products and traditions over the years.

2. Methods & Pedagogy

In terms of methodologies, the studio begins with a systematic literature review of landscape and urban theories, rural development, ethical tourism, and concerns and fears common in Italy today (e.g., depopulation, migration, heritage loss, etc.). Students also read, analyze, and synthesize research reports on the impacts of GI regimes around the world. Finally, the class familiarizes itself with the nomenclature and specifications of the designations common across Italy. These include *Denominazione di Origine Protetta* (DOP), or Protected Designation of Origin (PDO), which is among the strictest designations (e.g., Parmigiano Reggiano, Gorgonzola, Prosciutto di Parma, etc.). The DOP designation ensures that the entirety of the production process takes place in the specified geography using traditional methods and ingredients. *Indicazione Geografica Protetta* (IGP), or Protected Geographical Indication (PGI), is less strict. It mandates that "at least one of the stages of production, processing, or preparation takes place in the region" (European Commission, n.d., Geographical indications, para. 5). Though less well known, some common examples of IGP/PGI products include balsamic vinegar of Modena and Gragnano pasta. Specific to wine, *Denominazione di Origine Controllata* (DOC), translated as "Controlled Designation of Origin," was established in 1963 following the European Council's adoption of regulations to establish a common agricultural market. This highly restrictive designation, modeled after France's *appellation d'origine contrôlée* (AOC), regulates grape cultivation, production methods, aging times, and even maximum harvest yields (Rossi & Cortassa, 2021). Montepulciano d'Abruzzo and Prosecco are among the most commonly known wines bearing the DOC designation. This step, developing fluency and facility in the language of GIs, is critical. It is only through an intimate and nuanced understanding of the restrictions mandated by these designations that students can begin to reconceptualize the food and wine products at the center of their studio projects as "clients"—that is, precise, even picky, entities with unique histories, desires, and needs who become the focuses of architectural labor, innovation, and potential.

In the next phase of research, the class investigates all the GI products specific to the Marche, exploring conceptual possibilities (e.g., narrative, socioeconomic, ecological, etc.) and schematic potentials (e.g., spatial, material, circulative, etc.) rooted in the explicit desires, requirements, and prohibitions of the "client" (i.e., the GI product). Central to this work is the process of diagramming. To more effectively illustrate and explore the systems and communities that surround the products, students draw their way through a wide range of diagrams: actor-network diagrams to reveal social interactions and ecological systems, Sankey diagrams to understand material processing and waste, emergy diagrams (modeled after Howard T. Odum's work) to visualize the transformation of resources into goods, phenological diagrams to express time and cyclicality, and circulation diagrams to choreograph the movement of resources, product, labor, and tourists. (Odum, 1996). Taken in aggregate, these diagrams help shape the individual projects not only physically but also in terms of narrative and program development. In the final stages of conceptual development, student teams are asked to augment the program of each GI-producing facility to include spaces and activities that challenge the conventions of agrotourism. Added yet complementary programs—driven either internally by the ethics of the product itself or externally by the needs of the context—emerge organically through critical questions around topics like resource management, labor relations, cooperative ownership, circularity, migration, etc. These topical programmatic additions to the projects are vetted by the class for their synergy between product and place as well as appropriateness to community and context before being advanced as part of the creative output of the studio in its entirety.

Critically, students conduct this work—namely research, conceptual development, and schematic development—in small teams, routinely swapping collaborators and products in several rounds of research sprints. This accomplishes three goals: First, all students become familiar with all products under discussion. Second, students experience the working styles of multiple peers, laying a foundation for more intentional team development in the future. Third, each student invests their time and creative energy in nearly all products and potential production facilities. This approach to project development fosters a sense of multilateral investment in all projects, ultimately encouraging continued collaboration across and between project teams for the remainder of the semester.

3. Prodotti Marchigiani

The following speculative designs from the first iteration of this course illustrate the potential for complex project-based learning that can interweave social, ecological, and economic ambitions into architectural imaginaries when design and education embrace the periphery, both in terms of rural contexts at the literal fringe as well as factory-like environments typically treated as out of sight and, therefore, out of mind. Moreover, this work would not be possible without a transdisciplinary embrace of realms of knowledge, technical skillsets, and wicked problems that have historically existed on the periphery of architecture's assumed scope.

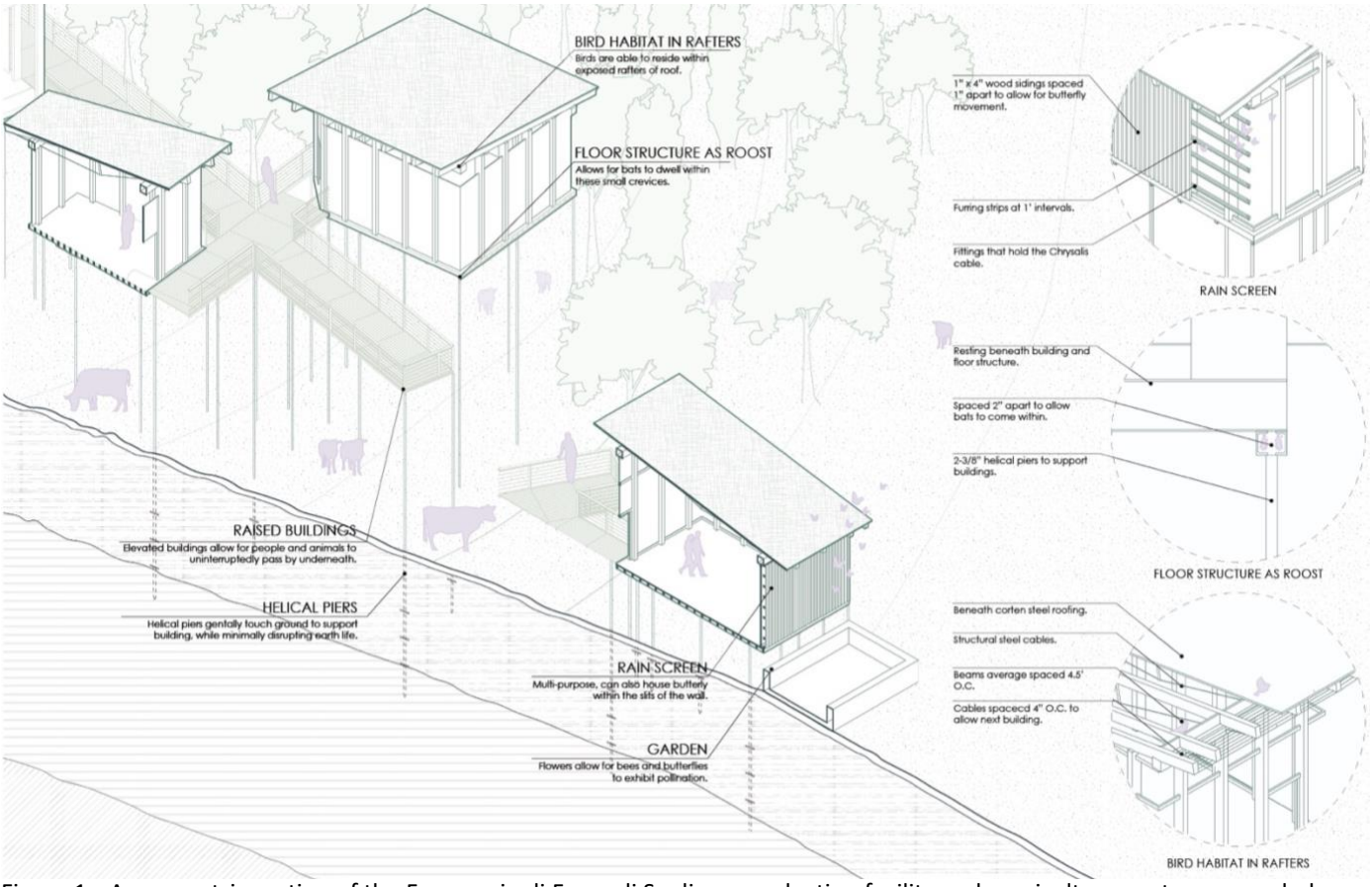

Figure 1. Axonometric section of the Formaggio di Fossa di Sogliano production facility and caseiculture center suspended above the dairy pasture. Detail callouts highlight novel habitat creation in the façade, eaves, and structure, which supports pollinator species typical to the montane grasslands of the Apennine mountains.

3.1. Formaggio di Fossa di Sogliano, DOP

One of the more unique cheeses of the Marche region is Formaggio di Fossa di Sogliano, DOP, a firm and pungent-smelling cheese that is traditionally sealed within a limestone cave to age for 2–3 months. This team proposed a caseiculture center, i.e., an educational cheesemaking facility focused on the specific ecologies of the Apennine mountains that fuel the production of this cheese. The stages of cheese production form a meandering path that guides visitors through the production process. All areas related to dairy processing seemingly float above the pasture, allowing ample grazing room below for cattle. Custom façade and eaves details of the elevated structures provide habitat for bats, bees, butterflies, and other pollinator populations typical to the area. The architecture here boldly broadcasts its ethic: respect place by touching the ground lightly. The only exception to this is the end of the path, which dives into the hillside, carving out a cool place for aging the product in its traditional pits and, later, ceremonially sampling it. Above all, this proposal insists that we question our present practices and reconsider our place—as humans, as consumers, and as makers—within the ecological communities all around us and to which, ultimately, we belong.

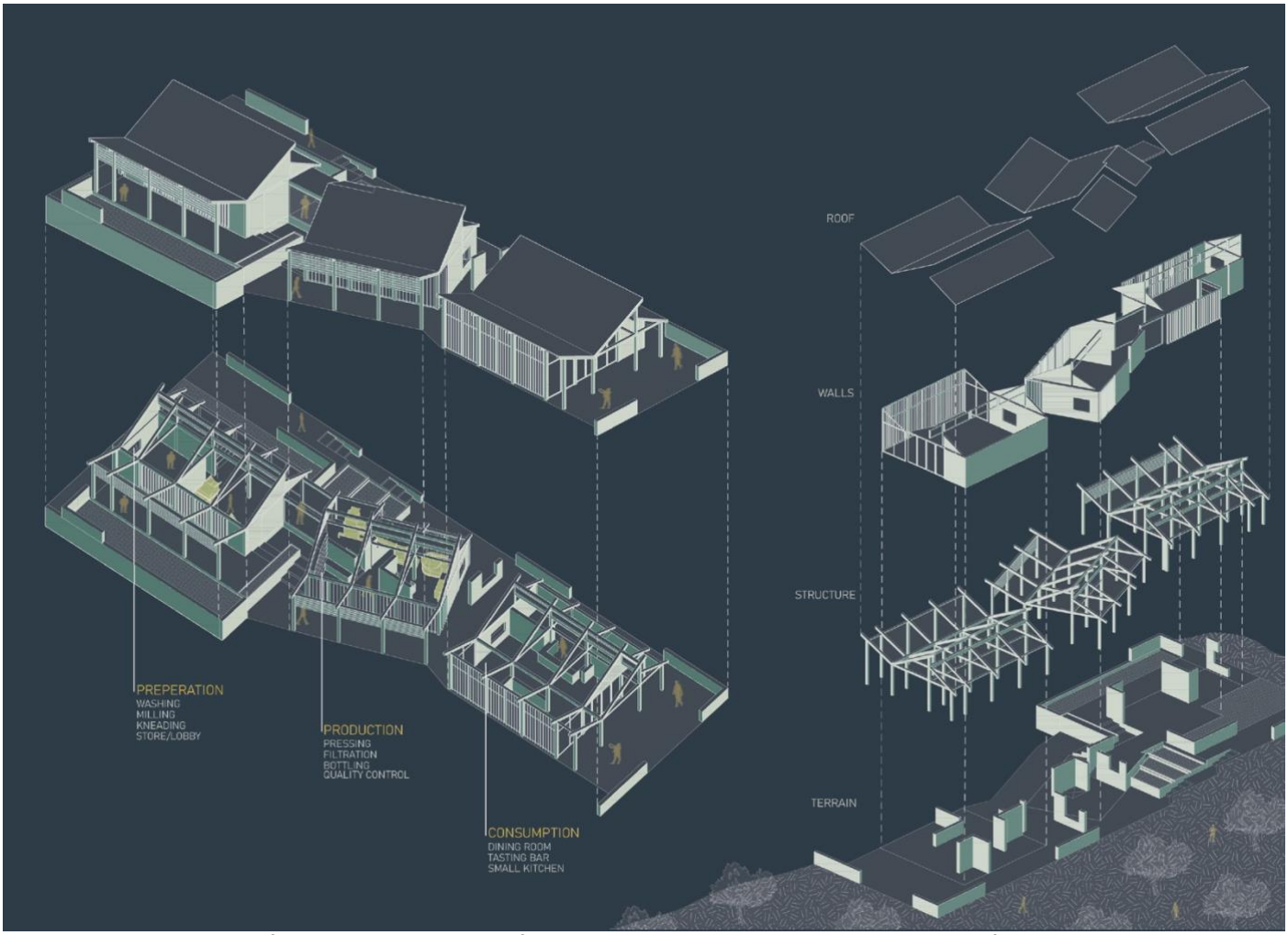

Figure 2. Exploded axon of the olive oil production facility reveals the organization and sequence of processing areas and structure, which are integrated among existing ruins on the site. Social and leisure zones are intentionally integrated into and along the workspaces to humanize the process and reinforce the dignity of laborers.

3.2. Olio extravergine di oliva Marche, IGP

This project focuses on the production of heritage olive oil in the Marche region as a means to create a more resilient local economy and community. The project, as proposed, can accommodate experiential agritourism with regular, short-stay lodging located throughout the orchard. In the event of a crisis, however, the complex can pivot to providing employment and housing opportunities for displaced communities. Ultimately the goal of this project is to design a system that spatially and socially intermingles labor and leisure and that, ultimately, enables the Marche to become more prepared, more compassionate, and more resilient in the inevitable event of future refugee resettlement efforts and migration crises resulting from anthropogenic climate change, global strife, and uneven international development. The project achieves resettlement through three methods of infill: rural, social, and urban. First, the rural infill involves the unbuilding of abandoned stone structures and the recycling of materials into a new olive oil production center. Second, the social infill involves the hosting of tourists and migrants on the grounds and intertwines those two communities in the olive harvest and oil production processes as well as the sharing of meals, resources, and social spaces in the worker housing. Finally, the urban infill occurs on a larger timescale as pop-up olive oil shops activate sleepy town centers around the Marche. With the introduction of each shop, refugees from the main olive oil facility are invited to lease to own the shop, each of which includes a modest apartment. These three methods of social impact architecture can help to carve a path forward for those seeking community, economic independence, and a place in the Marche to call home.

3.3. Rosso Conero, DOC

This proposal considers how to responsibly integrate a vineyard and vinification center into a set of overlapping, existing contexts: the suburban edges of the Commune di Camerano, the underutilized historic tunnels that weave below the old city of Camerano, and a warming global climate—an issue for wine producers throughout the region and, indeed, across much of the current wine-producing world. The design of the winery connects the vinification center to the historic tunnels which, purportedly, were used for storing Rosso Conero wine centuries ago. Vertical insertions into the areas of the tunnel system nearest to the surface provide daylighting to particular parts of the tunnel system to increase community use of the subterranean city, including use during the annual Rosso Conero festival. At the edges of the winery, tucked underneath a corner of one of the fields, an environmental educational center demonstrates how carbon dioxide (CO^2) generated as a byproduct of the fermentation process can be captured and converted into liquid CO^2 fertilizer, a crucial step toward decarbonizing the global wine industry.

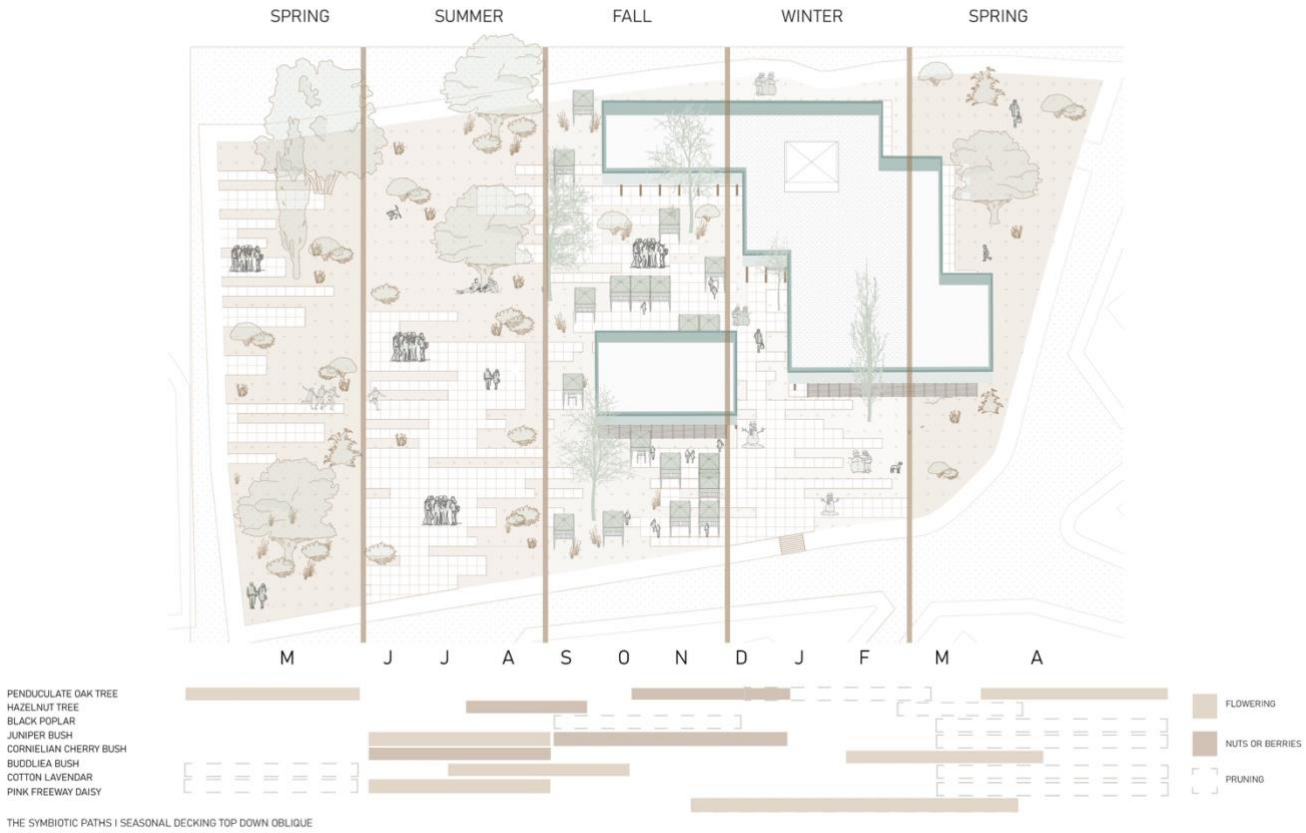

Figure 3. The white truffle research facility, located in the heart of Acqualagna, reinvents the classic central piazza by replacing the hardscape with a native landscape that can support truffle farming. A system of unitized, movable decking protects the truffles from harm during the growing season while simultaneously allowing locals to occupy the public space. During the autumn, when truffles are harvested, the decking gives way to the landscape, making room for the truffle hunt.

3.4. Tartufi Bianchi

The white truffle—though not a designated GI product—is a well-known and highly prized food. It grows underground among the roots of specific tree species (e.g., poplar, hazelnut, and oak), and its distinct flavor is used to add a powerful punch to pasta, risottos, and many other dishes. This project team identified that the astronomical value ascribed to the white truffle, as a commodity, is in tension with the ecological network of which the truffle is a part. Extractive attitudes toward harvesting undermine the public's appreciation and care for the extended environment of the *tartufo bianco*. Acqualagna, home to the Marche region's white truffle, is a small city surrounded by natural and agricultural landscapes; however, its urban fabric does not promote or reap all the

ecological benefits that it could. Botanist and author Peter Del Tredici writes about ways of finding the space between rural and urban and, ultimately, rejects the dichotomy. He questions the terms “native,” “exotic,” and “non-native,” pointing out how they promote divisions while failing to embrace or acknowledge the grey area (Riano, 2012). Socially and economically, the truffle is “native” to the urban environment; however, regarding the ecological fabric, it is a non-native species. The project aims to disrupt this dichotomy and embrace the grey area by planting trees with which the truffle has a symbiotic relationship in the urban fabric in order to re-integrate the truffle, ecologically speaking, into the socio-spatial fabric of Acqualagna.

This project also proposes the introduction of a truffle research center that would educate visitors on truffle cultivation at various scales—from the forest to the farm to the home garden. In addition to the research center, a newly planted “piazza” would be introduced to the site with movable units. With each season of the year, the movable piazza is rearranged in keeping with the needs of the truffle. During the summer, the paths multiply to protect truffles as they mature. In the fall, the decking thins out, allowing the community to harvest the crop as part of the annual National White Truffle Fair. From the piazza, passersby can glimpse the interior of the exhibitions, classrooms, research labs, and tree nursery found inside the lobby. The nursery would foster truffle-inoculated saplings that residents could plant on their property. Moreover, the movable path system of the planted piazza can be adopted by neighbors with adjoining properties in order to create communal spaces within the existing urban fabric. These shared spaces also allow community members to grow and harvest *tartufi bianchi* for personal use or as an additional income stream.

4. Discussion

Having recently concluded the second iteration of this studio, many successful strategies and methods were revisited, including rural-centric readings of urban and environmental theories, collaborative project development, deliberative team sorting, and flow- and network-based diagramming to understand production processes, ecological systems, and economic opportunity. However, two logistical aspects central to the studio brief continue to raise significant design-pedagogical questions: site inaccessibility and language barriers.

4.1. Limitations

First, given the geographical specificity of each product, the relative remoteness of most sites, and the limited means of mobility available to study-abroad students across the largely rural Marche region, most project sites remain practically inaccessible to student teams. This limitation poses serious questions about the authenticity with which projects can respond to, support, and honor local communities. Without a doubt, if a student team could easily visit a site, they would do so. In 2022, the white truffle team visited Acqualagna multiple times, including during the National White Truffle Fair. In 2025, the Formaggio di Fossa di Sogliano team visited and thoroughly documented their site in Fossombrone. Teams that could not visit their project sites relied on remote forms of observation and analysis, mainly mapping, diagramming, and collage, but also some interviews with topical experts. Overall, the non-site-visit teams employing a more para-local approach to site research tended to produce projects that emphasized systems (e.g., production, ecology, economy, labor, etc.) and abstracted contexts (e.g., landscape, markets, community, culture, etc.). Meanwhile, the site-visit teams employing direct observation engaged more thoroughly with the physical and spatial context of the site (e.g., materiality, topography, site approach, etc.) while still maintaining a clear focus on and command of relevant systems.

Secondly, though the projects have indeed yielded results, albeit hypothetical ones, which would appear to preserve intangible regional heritage, bolster rural communities, preserve habitat, tend to the land, etc., the authenticity and, thus, the ultimate efficacy of these socioeconomic and socioenvironmental design decisions have been limited due to language barriers. In rural Italy, English proficiency is often limited, and the students participating in this studio are not required

to learn Italian, nor do they have access to robust language-learning resources. As much as students endeavor to lead with empathy and regularly check their assumptions, the result of working across the language barrier has been a more top-down approach to planning and design. This inaccessibility of tacit, embedded social knowledge of place would almost certainly undermine core goals of the studio in any real-world context.

Figure 4. In 2025, the Formaggio di Fossa di Sogliano team chose to adapt an abandoned building on a bluff along the Metauro River as their main production facility after visiting the site in Fossombrone.

4.2. Conclusion

Despite these logistical shortcomings, this set of holistic rural design and development proposals—each crafted through iterative, ecosystemic research—has revealed a depth of empathy for local communities, laborers, and non-human species that goes well beyond that of most GI-producing enterprises and facilities. This deep sensitivity to and, indeed, profound care for place is a crucial first step for planners, developers, and designers who want to recenter community as core to successful and sustainable commercial development. This is especially true of rural areas, as they frequently suffer from human capital flight (or “brain drain”) due to the economic opportunities, amenities, and upward mobility, whether real or perceived, available in urbanized areas. Moreover, the disciplinary breadth and interdisciplinary complexity of each project—let alone that of the collective body of work explored in this studio—have modeled a sensitivity to context, both in terms of geographic specificity as well as environmental processes, that though not exactly requisite in the highly regulated realm of GIs is practically required to reduce the negative externalities that typify the production of consumable goods at a scale commensurate with the global food market. In summary, though the cottage industries that first instilled a sense of preciousness around would-be GI products are now rare, the globally commoditized identity of these artisanal consumables offers an opportunity for small communities, much like their funky cheeses and small-batch wines, to have purchase in an urbanizing world. The trick, this studio posits, is simple: The shapers of rural space and industry must recognize and respond to the complexity and uniqueness of the places of production as much as they do to that of the products. Constructing environments, growing economies, and building communities that mutually support one another is the only way to unlock the true and enduring value of product and place.

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Promoting Regional Landscape Integration: A Generative Design of Wind Turbines Based on Local Culture

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01 Abstract

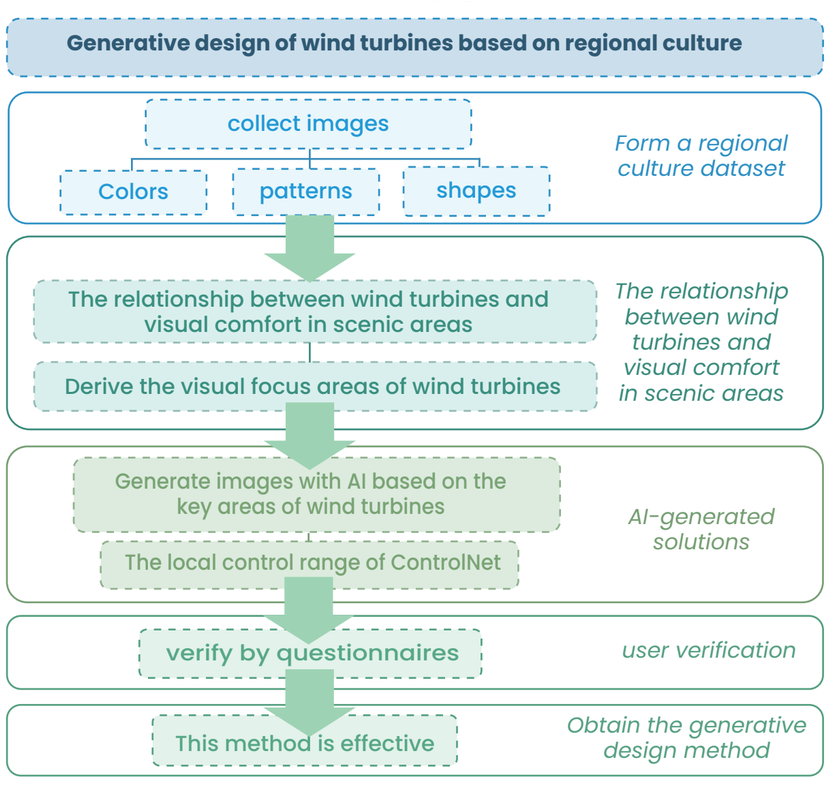
Objective: Wind turbines have become new landmarks in regional landscapes due to their massive size, but the homogenization of turbine designs has led to uniform scenery. To address this, this study introduces AIGC technology and proposes an efficient regionally adaptive aesthetic design method to enhance the integration of wind turbines with local landscapes.

Methods: Using the Houshuiquan Wind Farm in Taipusiqi, Inner Mongolia, as a case study, we systematically extracted local cultural elements and categorized them into three dimensions: color, pattern, and form, thereby constructing a cultural element application framework. Subsequently, we analyzed the relationship between wind turbines and the visual comfort of the surrounding landscape, identifying key ranges that align with local visual comfort standards. The refined cultural elements were then input into the AIGC model for training.

Results: The model-trained designs demonstrated significant improvements in both cultural alignment and visual comfort.

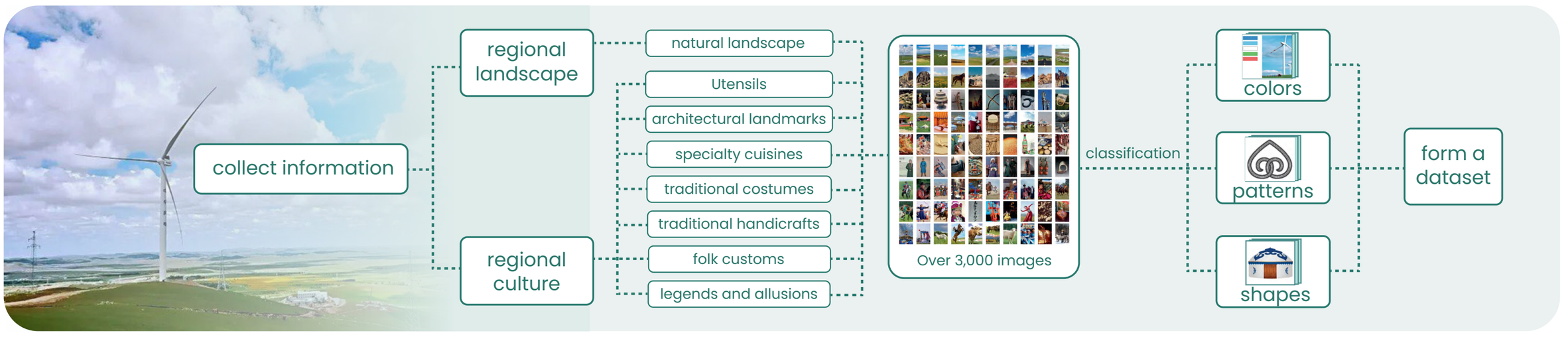
Conclusion: This study proposes a generative design approach for wind turbines based on regional culture, offering a new pathway for integrating wind energy with local landscapes and contributing to regional sustainable development.

02 Methodology and tools

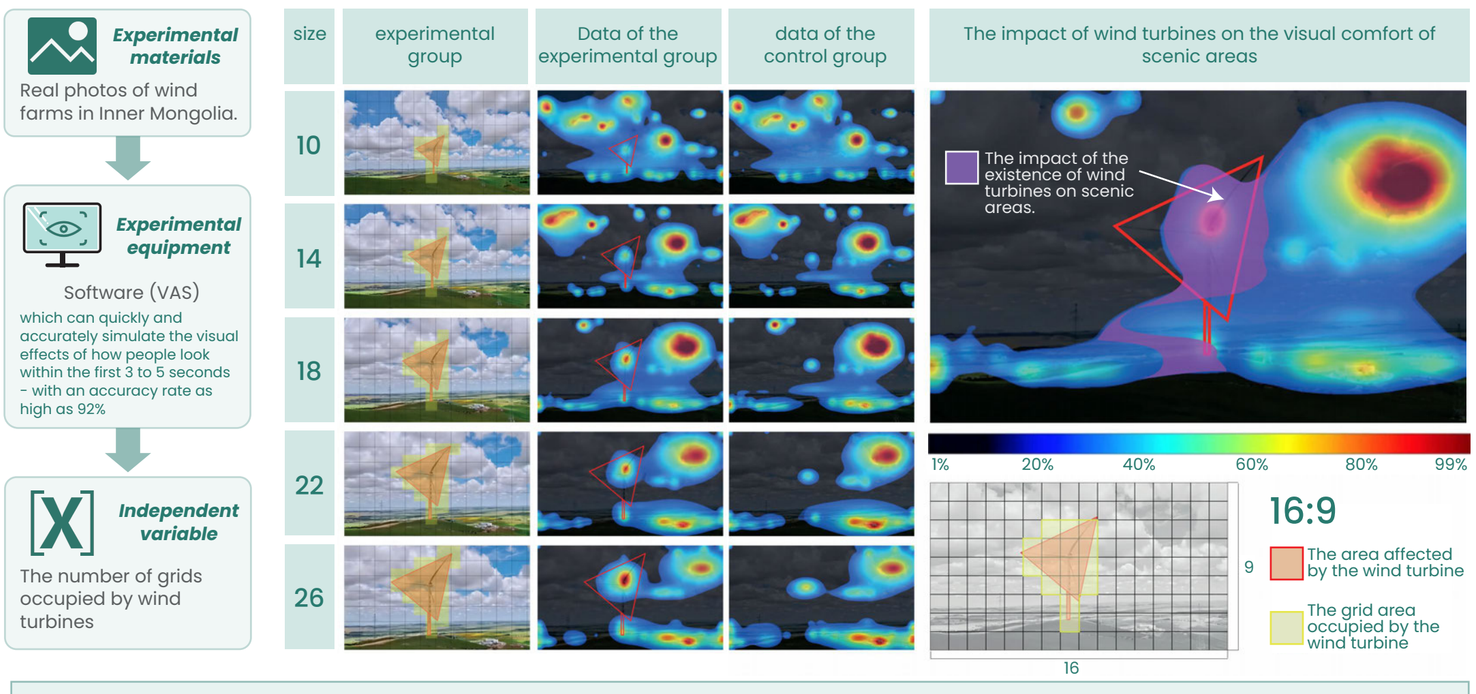


03 Research process

3.1 Methods for collecting, classifying and generating regional cultural elements.

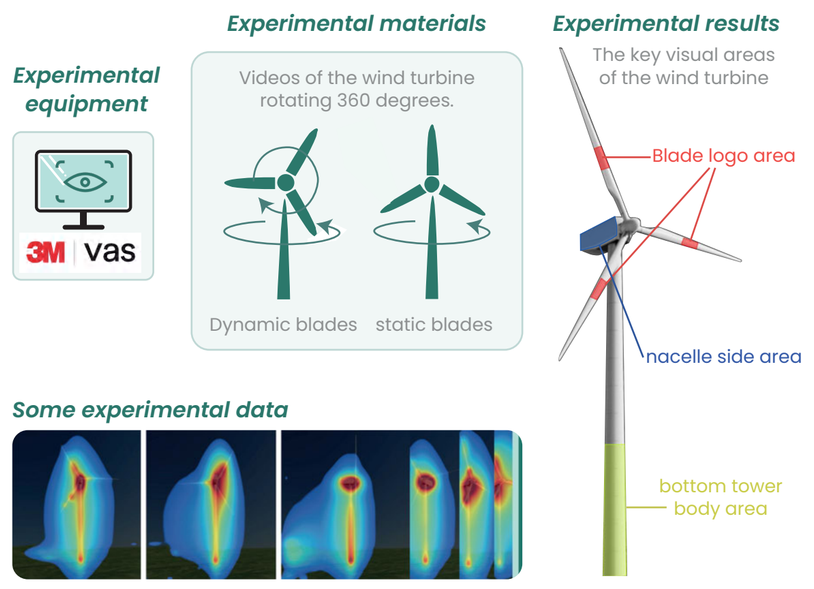


3.2 Establish the relationship between the visual comfort of wind turbines in scenic areas.



Results: When the number of grids occupied by the wind turbine reaches 18, the wind turbine changes from a secondary element to a primary element in the picture.The existence of the wind turbine has changed the distribution of visual attention in its surrounding areas.

3.3 The relationship between the visual responsiveness of wind turbines and the migration of elements to them.scenic areas.



3.4 Generation scheme and verification

3.4.1 scheme cases

3.4.2 user verification

15 *Subjects*
Students majoring in design

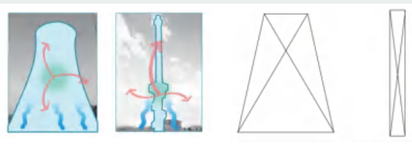
Equipment
questionnaires tablets

73% *Questionnaire results*
Users believe that this plan reflects the local regional culture and promotes the integration of landscapes

04 Expected

- When the number of grids occupied by the wind turbine reaches 18, the wind turbine will change from a secondary element to a primary element in the picture.
- The existence of the wind turbine has changed the distribution of visual attention in the surrounding areas of the landscape.
- The key areas of the wind turbine on which tourists' sight focuses are mainly concentrated in three parts: the blade logo area, the nacelle cover area and the bottom tower body area.
- The scheme generated by the wind turbine generative method proposed in this study has achieved significant improvements in both cultural fit and visual comfort after being verified by users.

Promote the integration of regional landscapes
boost the development of the tourism industry
expand the application of other disruptive landmarks.



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Reconnect with the Nearby: Smell-based storytelling in placemaking to enhance community connections

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ABSTRACT | The sense of smell, often regarded as a secondary sense (Shepherd, 2004), has increasingly been recognized in design for its profound influence on emotions (Ehrlichman & Bastone, 1992), memory (Obrist et al., 2014), and social interactions (Blomkvist & Hofer, 2021). Recent advancements in scent delivery and capture technologies have prompted discussions within the human-computer interaction (HCI) community regarding the integration of smell into design practices (Obrist et al., 2014). Additionally, smell evokes strong emotional responses, shapes the character of places, and conveys social meanings associated with people and their environments, making it significant in placemaking (Henshaw et al., 2017; Xiao, 2018). HCI researchers have explored how digital technologies can facilitate interactions between individuals and their environments, particularly through visual and auditory sensory interactions (Hespanhol, 2018). However, there remains a significant gap in the literature concerning the role of olfactory experiences in supporting urban residents' community awareness and exploration of their neighborhoods.

In this paper, we examine the potential of smell-based storytelling to foster community engagement and enhance local connections through creative design practice. The investigation focuses on two aspects: (1) an interactive installation designed to raise environmental awareness; and (2) a scent story map aimed at encouraging neighborhood exploration. We developed a scent installation and a prototype scent story map, both of which were co-created through a participatory process. Our findings suggest that integrating smell in placemaking enhances residents' engagement with their surroundings, fosters new sensory perspectives, and builds empathy through shared

smell related stories and experiences. Moreover, such a community engagement project strengthens connections between diverse community groups through collaborative processes. Ultimately, our research suggests that future studies could explore how a scent story map might function as a long-term participatory platform, enabling environmental rediscovery through smell, fostering connections among diverse groups, and reimagining shared community visions.

KEYWORDS | SCENT MAP, SMELLWALKING, STORYTELLING, DIGITAL PLACEMAKING, URBAN EXPLORATION, PARTICIPATORY DESIGN, SENSORY INTERACTION

1. Introduction

The sense of smell has increasingly been recognized in design for its profound influence on emotions (Ehrlichman & Bastone, 1992), memory (Obrist et al., 2014), and social interactions (Blomkvist & Hofer, 2021). In the HCI community, the use of scent for interaction and experience design is increasingly recognized for its unique link to emotions (Delplanque et al., 2017). In the urban context, the smell evokes strong emotions and conveys social meanings associated with people and places (Xiao, 2018). This design trend has inspired designers to use scent to enhance user sensory interactions and emotional connections (Maggioni, 2020).

As a practice of digital placemaking, this playful and reflective urban exploration is widely applied in examples like location-based games (2016) and immersive audio journeys (Sun, 2023). Consequently, maps have evolved from being purely functional tools for navigation into mediums that encourage exploration and interaction. However, these practices are predominantly guided by visual and audio perception, lacking the integration of multisensory (Hespanhol, 2018), particularly olfactory experiences, which are among the earliest senses tied to wayfinding (Jacobs et al., 2015; Vasilikou, 2016).

Through a scent story map, this study offers residents a new way to explore their neighborhood. It aims to provide a narrative urban experience that transcends visual, linguistic, and cultural barriers through olfactory empathy. By employing a participatory design approach, residents are invited to become active users, perceiving and collecting scents through smellwalking, mapping these scents, and collaboratively creating a map that incorporates digital storytelling to narrate personal stories. An interactive prototype was then designed and tested in the field to validate the concept and gather feedback. Finally, the study presents the first findings of a community engagement project exploring how smell-based storytelling can strengthen local connections and how a scent story map can serve as a long-term platform for future community building.

2. Related Work

2.1. Smell, Place and Storytelling

The sense of smell is one of the most complex human senses, significantly influencing emotions and memories (Obrist et al., 2014). Traditionally, smell has been often considered a minor sense compared to vision, hearing, and touch (Shepherd, 2004). However, designers are increasingly acknowledging the importance of smell across various design disciplines (Lupton and Lipps, 2018). In the HCI community, the application of scent in interaction and experience design has been growing steadily in recent years. From smell-enhanced technologies (Maggioni et al., 2020) to smell-based personal experiences (Brianza et al., 2022), the subjective nature of smell, which is deeply intertwined with personal storytelling (Obrist et al., 2014), holds significant relevance for smell experience research.

Most recently, at the smell-centered future workshop (Beşevli et al., 2024), scent was proposed to be applied in placemaking to enable social interaction. In urban studies, the relationship between smell and place has long been recognized (Porteous, 1985; McLane, 2013; Xiao, 2018). The term "smellscape" is used to describe the olfactory environment of a location as experienced by individuals at a specific moment in time. Research indicates that smells play a crucial role in shaping the character of places and building emotional connections between individuals and their environments (Xiao, Aletta & Radicchi, 2022). Therefore, there is an opportunity for design research to explore how to enhance community connections through smell-based storytelling.

2.2. Placemaking, Urban Exploration and Map

Placemaking, a concept that originated in the mid-20th century (Whyte, 2012), has evolved into a holistic approach that emphasizes fostering vibrant public spaces and building stronger community connections. Digital placemaking, which leverages digital technologies, introduces technological augmentations that enhance places with location-based content, fostering meaning co-created both virtually and onsite (Basaraba, 2023). However, digital placemaking historically relies heavily on visual perception (Hespanhol, 2018), which can overlook important sensory interactions with the physical environment. To address this, a growing number of initiatives have begun to engage different senses, incorporating audio, touch-based interfaces, and immersive environments that encourage physical movement (Hespanhol, 2018). Despite these advancements, the role of smell in placemaking remains underexplored.

As a practice of placemaking, the practice of playful and reflective wandering in the city has a rich history, from Jane Jacobs's Walk (Sung & Lee, 2015) to modern digital tours like location-based games (2016) and immersive audio journeys (Sun, 2023). Maps, rather than serving merely as tools for direction, also become mediums for immersive experiences, enabling people to navigate their surroundings with greater awareness and engagement (Fischler-Ruiz et al., 2021). While research suggests that humans possess scent-tracking abilities for navigation (Jacobs et al., 2015), traditional map information remains primarily visually oriented. Exploring how to integrate scent with maps to encourage new ways of experiencing the surrounding environment is a promising area for further investigation.

3. Project Concept

This research introduces an interactive and participatory platform designed to raise awareness and encourage local storytelling and exploration of Elephant and Castle area in London through multisensory experiences. The platform features two primary components: (1) a scent interactive installation showcasing scent jars accompanied by ambient sounds and abstract story overviews, and (2) a scent map application that guides users to corresponding locations while allowing them to listen to detailed narratives. Together, the physical installation and virtual map application together constitute a participatory platform (see Figure 1).

Our platform guides users to explore the area through smell-based storytelling, unfolding in the three phases. The scent installation is strategically placed in a community public center to attract attention, allowing users to interact while listening to abstract narratives (see Phase 1). The mobile application displays a map of these scent locations, where users can hear the full story at specific sites, akin to a clue and its treasure map (see Phase 2). Users can share their location-related stories through the application, or the toolkits placed with the installation (see Phase 3). Our project aims to encourage people to venture outdoors and engage with their real surroundings.

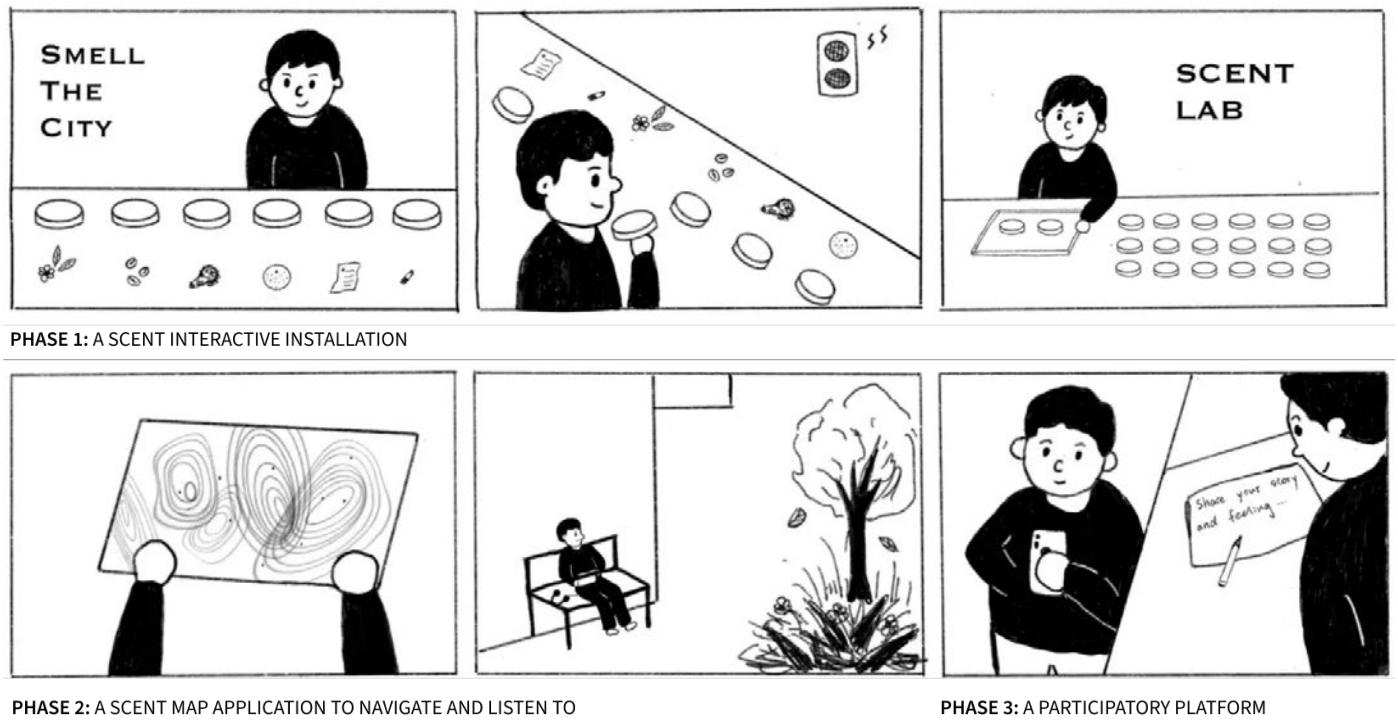

Figure 1. A diagram about the project concept; from Phase 1 Scent Installation to Phase 3 Participatory Platform

4. Smellwalking and Community Scent Collection

4.1. Research Methodology

The study aims to collaboratively collect location-based olfactory data for the Elephant and Castle community, establishing a unique olfactory identity for the area through personal narratives. To achieve this, we employed a combination of smellwalking and

digital storytelling, inviting residents to explore the neighborhood, document meaningful scents, and share personal narratives associated with those olfactory experiences. Smellwalking is a form of sense walking that allows for the investigation and analysis of how we understand and experience space (Adams & Askins, 2009). It provides a valuable method for gaining insights into people's everyday olfactory experiences and memories tied to geographic spaces and places (Henshaw, 2013). In parallel, digital storytelling (Wilson, 2021) was incorporated to allow participants to share personal narratives connected to specific scents and locations. Participants verbally described their experiences, stories, and emotions associated with smells and places, which were captured through audio recordings. This process preserved their voices, emotions, as well as the environmental sounds.

Preliminary research was conducted by initial fieldwork and context analysis to define the scope of smellwalking area. For example, based on the concept of the 15-minute city (Moreno, 2021), which encourages a return to local life, the walking area was set to extend approximately one kilometer from the Elephant and Castle station to Walworth Road and its surroundings. By incorporating investigations on historical and cultural contexts, as well as preliminary field observations and open interviews, we refined the walking route to cover indigenous areas, newly developed regions, and retail zones.

Two smellwalks were carried out, each with six participants from both the Indigenous area and the newly developed residential zone. The first walk was conducted on a sunny day, with the presence of wind amplifying participants' sensory perceptions. The second walk took place following rainfall, during which the damp conditions introduced additional olfactory elements to the urban environment. Both walks were scheduled in the afternoon, a period identified through field observations as the time of peak activity within the area.

Figure 2. The smellwalk route and collection of results of the first walk.

Information from the smellwalks was collected through a combination of direct participant interactions, such as post-it notes and collecting scent samples, along with audio recordings converted into notes. An essential aspect of smellwalking is the mapping, and representation of smells detected in each area (Henshaw, 2013). We collected samples of smell and labelled them on a physical map during the process where possible (see Figure 2).

4.2. Result and Discussion

Through these participatory smellwalks, 12 location-based stories involving 45 distinct scents were gathered from 12 participants. This demonstrates that olfactory perception in the environment is not singular but multifaceted. For the scents, based on scent sample and notes, and Henshaw's criteria (2017), the researchers documented the names, locations, collection methods, preservation techniques, and scent intensity (see Figure 3) of the scents. The positional and intensity data serve as the foundation for the design of the olfactory map. The feasibility of scent collection and preservation also informed the design of the scent-based interactive installation. Given the limitations of collection technologies, some scents were supplemented based on participants' descriptions rather than collected directly on-site.

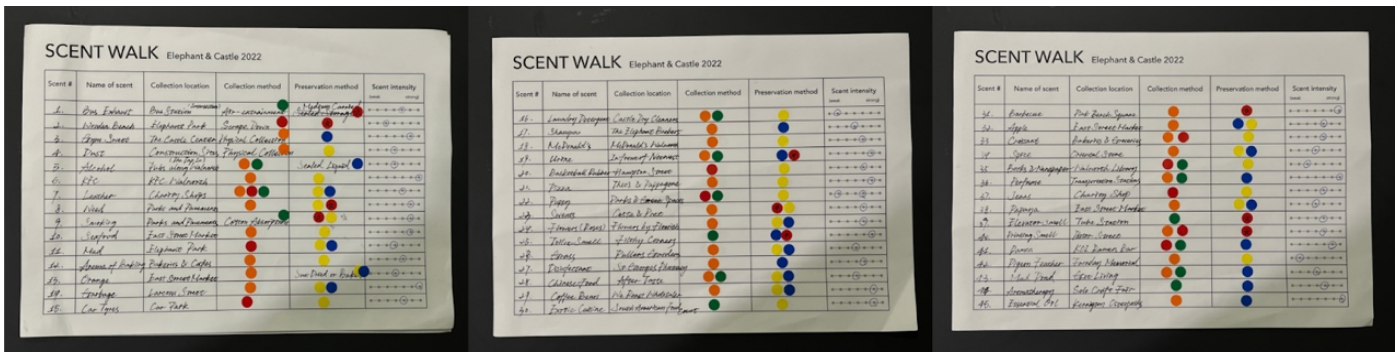

Figure 3. Scent documentation of names, locations, collection methods, preservation techniques, and scent intensity.

For the stories, drawing on the audio recordings and detailed notes, abstract ambient soundscapes and brief textual descriptions were created for each site (see Table 1). These auditory and textual complements were carefully designed to encapsulate the essence of each location, serving as enhancements to the olfactory experiences and deepening the audience's understanding and emotional connection to the smells.

Table 1. Notes about background soundscapes and textual descriptions.

Place	Scent	Sound	Title	Description Text
Construction Site	Soil, dust, oil	Construction, excavation	Transformation	The excavation, the emergence of new things, the vision of a brighter tomorrow?
Elephant and castle train station	Body sweat, newspaper, flower	Train arriving	A hug	A warm embrace through the thick fog, the humid air, and a memory-filled farewell.
Food Court	Spice, curry, pepper, onion	Talking with SA music	Grandma's kitchen	Good wine needs no bush. Through the magic tunnel, it's the place I miss the most.
Bodley Way Playground	Wet soil, wooden chair, wet plants, grass	Raindrop with wind	Rainy days	Escorted by moist foliage and untouched innocence, devouring the air avariciously.

Corner if the florist	Flowers, coffee, croissant, dog	Puppy bark	Puppy's day out	What trouble can a puppy have? It's a beautiful world out here!
Junction of a Chinese supermarket	Chinese spices, Chinese dim sum, roast duck	Picking with Jay music	After hours	A weary heart wrapped by the amber light and soothing aroma, I'm floating.
Bench in front of the library	Books, newspaper, leaves	Breeze	Goksel's inspiration	Caressing the pages within grasps, feeling the breeze across eyelashes, waiting for epiphany to touch.
Pink bench in the square	Beer, BBQ, fried food	Pub music	Friday night	Clinking glasses, intoxicated crowd, there is no moment like now.
Walworth road bus stop	Tobacco, waste gas, KFC	Busy road	Spare some change	Hands reaching out, hoax settling in, no one is a stranger.
Pink café alley	Bakery, sandwich, coffee, garbage, weed	Quiet cafe	Sunday morning	Sunlight cast mottled shadows through swaying leaves, Retrieving memories piece by piece.
Entrance to an NGO	Secondhand book, food, cigarettes	Wind with a distant train	Freedom	A taste of goodwill, a revisit of simplicity, in a place where shackles are no more.
East street market	Orange, apple, papaya, chips, seafood	Hawking	Haggle	Is it a brutal battle of words, or an elegant dance of tango? so vibrant and alive!

Our research revealed two intriguing findings. First, the same scent was perceived differently by participants, with varied atmospheres and roles in their storytelling. This indicates that people's perception of smell is deeply shaped by individual characteristics, habits, and life experiences (Henshaw, 2013). Second, our study highlighted the transient nature of local scents and the complexity of multi-scent environments in real-world settings. Storytelling emerged as a communication tool for providing context to these smells, enhancing both their expression and understanding.

5. Design of Scent Installation

5.1. Interactive and Product Design

As envisioned in the project concept, the interaction involves participants smelling scents to trigger the installation, which then plays the corresponding ambient sounds. Starting with a prototype, pressure sensors were implemented to detect when a scent jar is lifted. To enable the installation to play sounds for all 12 scents simultaneously, 4 control boards were used in conjunction with speakers, accommodating multiple users experiencing the installation at once. Once a participant picks up a scent jar, the ambient sound of the corresponding place is played, enhancing the understanding and associations related to the scent narrative.

For the placement of the installation, the treehouse in Elephant Park, a newly opened community public space, was selected to enhance community attention and participation. We initially explored various design concepts through sketches and ultimately decided on a box stand integrated into the treehouse's window display. The dimensions of the window were carefully measured to ensure the design fits harmoniously within its original context. Building upon the sketches, detailed drawings of each panel were created using AutoCAD for laser cutting. Considering aesthetics and consistency with the treehouse environment, wood was chosen as the primary material for the installation. This choice contributes to a warm and inviting atmosphere. Additionally, speakers were embedded within the wooden panels to enhance the overall integration of the installation.

5.2. Scent Storytelling Design

As revealed in the research, the olfactory narrative of a location encompasses multiple scents, and designing with this multiplicity is essential. While experiencing a single scent at a time can create a more linear and clear narrative, real-world experiences often involve the simultaneous perception of various scents that influence each other. To capture this complexity, we combined several scents into a single jar, fostering interactions between them and encouraging imaginative associations. Building upon the scents collected by research participants, we supplemented the collection and preservation of various scent types to address potential issues of degradation over time. We employed various techniques to ensure the scents remained vibrant and authentic: solvent extraction for plant materials, abrasive methods for solids, and adsorption for liquids and gases, contributing to a rich sensory experience.

In addition to the ambient sounds, inspired by the fragrance industry's scent displays (Ltd, D. G. V. U., 2020), we presented the scent-place stories alongside cards that the brief description and the collection date (see Figure 4). The textual descriptions were crafted from the original participants' contributions, enhancing their poetic quality to evoke imagination. The addition of sound and text offered a narrative context for the scents, enabling participants to engage multiple senses. This multisensory interaction fostered deeper empathy and reflection by situating the scents within specific contexts.

Figure 4. A scent jar with description card and a participant interacting with it.

6. Design of Scent Story Map

In line with the project concept, our research aims not to transform the environment's smellscape, but to encourage people to explore its original character. A digital scent map was provided to participants, showing the corresponding locations of the scent stories featured in the installation, allowing them to visit these places if intrigued by a particular smell or narrative (see Figure 5). Utilizing location-based technology, participants could immerse themselves in oral stories from residents as they approached each site. Along with text and audio to aid understanding, the visual map facilitates the "sniffing" process during the exploration. The scent visualizations are inspired by the categorization and representation methods from urban smellscapes (McLane, 2013). The 12 locations and corresponding scent distributions, collected during the research, are presented on the

map, providing details on the intensity and spread of each scent.

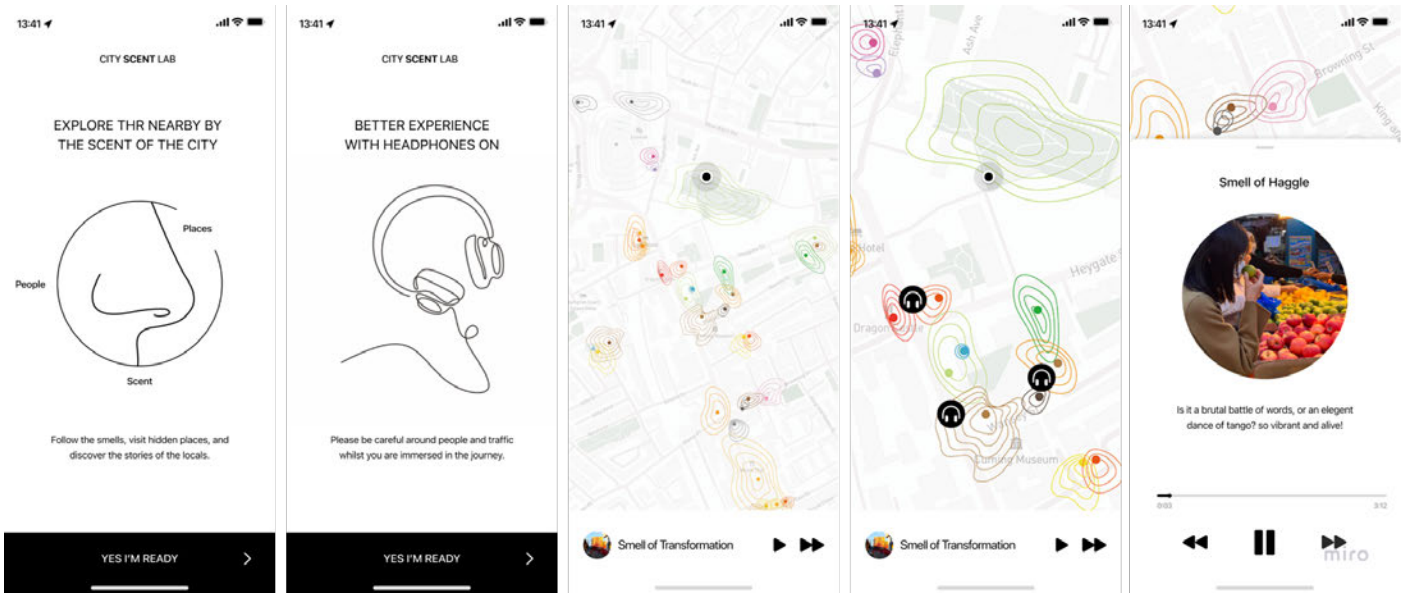

Figure 5. Scent story map application interface.

For prototyping, 3 of the 12 scent stories contributed immersive narrative audio through the storytelling workshop, which was incorporated into the scent journey. Created from the digital storytelling process (Wilson, 2021), we developed the script, recorded voice, and edited with music and ambient sounds with the story owners to refine the audio guide. Additionally, to enhance user engagement, extracted scent samples were hidden in the environment, waiting to be discovered (see Figure 6). This approach acted as a reward, encouraging people to explore further.

Figure 6. Scent samples were collected by a participant

7. User Study and Findings

The user study involved an interactive installation featuring 12 scent stories and an application prototype containing audio for three of those stories. The installation was placed in the community treehouse, which also served as the place for post-test feedback. During the exploration using the application prototype, I accompanied participants, helping to play audio according to the route to simulate the experience of

location-based audio content. The testing aimed to (1) determine whether users could understand and complete the interaction process, (2) evaluate users' comprehension and emotional response to the stories told through the scent installation, and (3) assess whether the scent experience enhanced their awareness, empathy, and connection to the neighborhood.

There were 10 residents participated in testing the installation, with the task of interacting with various scent jars and describing their understanding and feelings about the scent narratives. Of these, 3 had time to engage in the simulated scent story tour. Their task was to select a preferred scent, explore the neighborhood using the map, and listen to the accompanying narrate and provide feedback while experiencing the described scent in the physical environment. After testing, each user was invited to share their own scent story, inspired by the narratives they experienced, using cards and scent source materials provided on-site (see Figure 7). This test was not only aimed at assessing usability and experience but also became a process of placemaking and community participation.

Based on the testing results, all participants successfully completed the interaction process. Regarding the feedback on the scent installation, people appreciated the experience of sniffing the scents with sound and found the descriptive text on the cards to be poetic, sparking their imagination. However, some participants experienced a disconnect between the scent and what they expected based on the name or description, leading to a degree of interpretative difference. Given the subjective nature of the olfactory sense, this bias was inevitable, yet it also provided valuable insights for the research by offering additional perspectives. Interestingly, participants actively tried to discern the various scents within each jar. This not only demonstrated the appeal of revealing the "scent mysteries" during the map-based journey but also suggested that this curiosity could inspire further design directions in the field of olfactory interaction.

During the experience of the scent story map journey, participants reported that the audio stories were enjoyable, but they had difficulty finding locations based solely on scent visualization. They often relied on the base map, location descriptions in the stories, and their familiarity with the area. This highlights the necessity of retaining the neighborhood’s base map in the design for usability. Participants also engaged in finding the scents, attempting to locate each corresponding point on the map, prompting reflection on the interaction mechanism. Ultimately, the goal of the project is not merely to locate places and stories but to encourage participants to explore and wander, emphasizing personal experience. Therefore, balancing attractiveness and engagement while avoiding a purely checklist-style experience is a critical consideration for future development.

Participants were highly engaged in sharing their scent experiences. For instance, regarding the "Sunday Morning" story, a participant from South America described the aroma of handmade bread after Sunday prayers in his hometown. He even brought and shared his hometown bread with others. Despite his limited English skills, the participants held hands and experienced the prayer together. This shared perception of smells and emotions transcended language and cultural barriers, fostering connections among participants. This outcome validates both the testing and research goals. The findings confirm that smell-based storytelling can help with understanding and empathy, thereby enhancing local connections. Moreover, the study shows that olfactory perception and experience are subjective and deeply influenced by personal experiences. To address this subjectivity, a platform could be provided where participants share their feelings and stories as they engage with the scents, allowing for resonance among those with similar experiences and exchanges among those with differing perspectives.

Figure 7. Participants sharing feedback with their own stories

8. Conclusion and Future Work

In this paper, we have presented the potential of smell in placemaking by collaboratively collecting, crafting, and presenting 12 local smell stories with residents. We employed a hybrid approach of sense walking and digital storytelling, where audio narratives made abstract olfactory experiences more comprehensible, and visual mapping allowed the elusive nature of smells to be more traceable. Through this collaborative process, storytellers contributed stories during the walks, while audiences provided generative feedback, empathy and aspirations. Both storytellers and audiences noted that the experience strengthened their connections to the place and its people. Despite the increasing application of interactive technologies in environmental and placemaking contexts, the use of smell as a sense to interact with remains limited. This practice offers valuable insights into fostering connectivity and a sense of place through smell. However, the process does rely on the diverse capacities of people to express and share their experience through narratives. As such, providing a structure of location- and scent-based storytelling to handle this diversity will be a key consideration for our next step, ensuring comparability and coherence of the results.

In the future, our goal is to establish a platform in both physical (e.g., in-person workshops) and virtual spaces (e.g., an online scent map application) to ensure long-term operation and encourage broader community participation. Ultimately, we believe this research enriches existing technology-driven olfactory studies and provides a productive starting point for designing smell experiences that support placemaking and community engagement.

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REGENERATE THROUGH PLAY: INCORPORATING HUMAN-NATURE DYNAMICS IN DESIGN EDUCATION.

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ABSTRACT | This 90-minute workshop invites 20 conference participants to co-design four multiplayer games that integrate design education with systems thinking to address human-nature interactions and sustainability.

Climate crises exacerbate socio-economic disparities and political tensions (Cannon et al., 2020; Willige, 2024), linking to global geopolitics (Ghosh, 2017). Design education must equip students—especially undergraduates, the majority of whom do not pursue postgraduate studies (All India Survey on Higher Education, 2024)—to engage with these complexities. However, teaching complex theoretical models like Life Cycle Analysis and the Circular Economy at Undergraduate level remains challenging. In these contexts, active learning can enhance comprehension and retention (Minnick et al., 2022). Zimmerman (2008, 2022) argues that games can offer opportunities for understanding complex systems by introducing participants to systems literacy through structured play. Through games, people can also learn to interact with, modify, and innovate within systems. This approach also strengthens students' ability to apply theoretical knowledge to practical contexts. The proposed workshop merges play-based active learning with systems thinking to demonstrate application of complex theories through active learning.

WORKSHOP STRUCTURE:

The session unfolds in two phases: a 60-minute design period followed by 30 minutes for play and feedback.

1. Introduction (20 minutes)

An overview of game-based learning and its relevance to teaching complex systems will be presented. Two game models will be introduced - a) Games with Narrative Co-creation (such as Dungeons and Dragons); b) Games that simulate real-life complex systems. In the former, players have greater agency and in the latter, systems dictate players' actions more. Key theoretical concepts will be discussed — such as Systems Thinking, Life Cycle Analysis, Tensions among key stakeholders and socio-ecological resilience.

2. Game Design Phase (45 minutes)

Participants, grouped into four teams, will receive toolkits that include case study prompts, a game mechanics template, and materials for prototyping. Each team will explore a specific prompt — such as life cycle analysis, ethics of eco-friendly alternatives, stakeholder tensions in sustainable design practices etc. These are chosen to illuminate complex socio-ecological systems and stimulate discussion on integrating theory with practice. The participants will be given the option of choosing between one of the two aforementioned game play models. This phase will divided as follows:

- Step 1: Concept Development (20 minutes) – Teams define their game's objective, target audience, and mechanics
- Step 2: Quick Prototyping (20 minutes) – Teams create a rough version of their game using provided materials, incorporating role-playing, strategy, or cooperative problem-solving elements.
- Step 3: Game Rules & Testing (10 minutes) – Teams refine game mechanics, ensuring clarity and feasibility.

3. Playtest & Discussion (25 minutes)

Phase 1 (15 minutes): Each group rotates to playtest at least one other team's game while providing structured feedback in templates provided. The templates will include questions pertaining to engagement of players, simulation of real-life complex systems, player agency etc.

Phase 2 (10 minutes): A concluding discussion will synthesize insights on applying game-based learning in design education and potential adaptations for different classroom settings. Participants take back a methodology for active learning that can equip future professionals to navigate and address global environmental challenges responsibly and creatively.

KEYWORDS | DESIGN EDUCATION, GAMEPLAY, CLIMATE CHANGE, COMPLEX SYSTEMS, CO-CREATION

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Khushboo Jogani brings 20 years of experience in product design, ranging from luxury lifestyle to industrial products. She believes that "design is about seeing the invisible and making the impossible inevitable," combining aesthetics, functionality, and marketability. Her teaching philosophy emphasizes the ongoing cycle of unlearning and relearning, creating a dynamic environment where design thinking evolves. Khushboo encourages students to critically reassess their

understanding and prepare them to become visionary thinkers ready for future challenges. Her approach is both pragmatic and innovative, focusing on designs that are aesthetically pleasing and socially impactful while being business-savvy.

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Reimagining homes: How regenerative retrofitting can foster sustainability, Ecological Citizenship, and resilient communities

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ABSTRACT | Retrofitting residential houses is still an underutilised option for addressing the climate crisis and meeting the growing demand for more sustainable housing. While energy efficiency is a significant focus of many retrofit efforts, popular techniques often overlook the broader ecological and social dimensions of sustainability, such as the reduction of embodied carbon and the enhancement of connections between people and the environment. Concurrently, fostering Ecological Citizenship, where individuals actively engage in environmental stewardship and contribute to community resilience, is critical in addressing systemic challenges like biodiversity loss, social inequality, and climate adaptation. This article investigates how regenerative retrofitting, an emerging approach to retrofit design, can bridge this gap by transforming homes into active agents of ecological renewal. By incorporating nature-based solutions, circular material strategies, and participatory design practices, regenerative retrofitting not only mitigates carbon emissions but also nurtures a deeper sense of environmental responsibility among residents. Through a case study of the *Wildhouse* project in Brighton, this work explores how one initiative integrates retrofit practices with the principles of Ecological Citizenship and sustainable living. By examining the project's design, its mechanisms to facilitate human (as) nature connections, and its mission to define more tangible links between the homes of people and other forms of nature the research demonstrates how regenerative retrofits can reframe housing as a locus for ecological restoration and as a route to tackle some societal issues. In doing so, it highlights the potential for scaling such interventions to

create more resilient, nature-integrated urban environments that contribute positively to environmental sustainability, social equity, and long-term climate resilience. Furthermore, the research emphasises how regenerative retrofitting can influence housing policy, urban planning, and broader systemic change, offering a holistic approach to sustainability that addresses both the physical and social fabric of cities. Through its exploration of the intersection between retrofit design, ecological engagement, and community empowerment, this work contributes valuable insights into how residential retrofitting can play a pivotal role in advancing both ecological and social sustainability in urban settings. The future research directions informed by Wildhouse offer space for further exploration of the long-term, wide-ranging impacts of regenerative retrofitting in social housing. By addressing questions about the agency of domestic objects, spaces and interactions as route to ecological citizenship, economic viability, institutional barriers, community engagement, health outcomes, and climate adaptation, future work can deepen our understanding of how regenerative design can be implemented on a large scale, ensuring that it contributes to both ecological restoration and social well-being for generations to come.

KEYWORDS | regenerative retrofit, ecological citizenship, reciprocity in design

1. Introduction

Retrofitting domestic properties is a crucial yet underutilised strategy for tackling the climate crisis and advancing sustainable urban living. While retrofit initiatives increasingly target energy efficiency, through insulation, solar panels, and heat pumps, they often neglect broader environmental impacts such as embodied carbon, biodiversity, and community involvement. To fully realise their potential, retrofits must be reframed as regenerative interventions that strengthen both ecological systems and social well-being (Fawcett & Killip, 2019; Pomponi & Moncaster, 2017).

Regenerative retrofitting, as presented in this paper, is a concept that draws on existing literature around sustainability and environmental design but is reinterpreted through the lenses of biophilic design, regeneration, and ecological citizenship. While these concepts have been discussed separately in the literature (Reed, 2007; Beatley, 2011), we propose a specific, integrated approach that combines them within the context of retrofitting. This approach goes beyond technical upgrades by embedding principles of the circular economy (Mang & Reed, 2012), biophilic design (Kellert & Calabrese, 2015), and participatory processes (Middlemiss & Parrish, 2010). It emphasises the use of natural and reused materials, integration of green infrastructure like living walls and roofs (Mang & Reed, 2012), and the design of adaptive, climate-responsive spaces. These interventions not only reduce environmental impact but also support mental health, indoor air quality, and stronger community ties (Beatley, 2011).

At the heart of this transformation lies the concept of Ecological Citizenship, a model of active environmental responsibility where individuals and communities participate in sustainable practices, from material choices to local ecological restoration (Light, 2006). Engaging citizens in the retrofit process fosters a sense of ownership and connection to place, helping to embed long-term pro-environmental behaviours. This is particularly important in social housing, where residents are disproportionately affected by climate change yet often excluded from

sustainability solutions (Shaw, 2012).

The Wildhouse project in Brighton exemplifies this approach. By combining bio-based materials, passive design, and resident co-design in a social housing context, it repositions retrofit as a collaborative and regenerative act. This case study highlights how such models can scale across different urban contexts, shaping housing policy that is both environmentally and socially just (Smith & Stirling, 2018; Rydin, 2013). Ultimately, this paper argues that regenerative retrofitting, rooted in biophilic design and ecological citizenship, offers a powerful strategy for transforming homes into active agents of sustainability. By integrating nature, reducing embodied carbon, and involving communities, retrofitting becomes more than a technical fix—it becomes a catalyst for ecological and social regeneration in cities (Hill & Mazzucato, 2024).

2. Underlying themes

2.1. The need for retrofit

The built environment is a major contributor to climate change, accounting for almost 40% of worldwide energy-related carbon emissions (Huang et al., 2024). Historically, sustainability initiatives in this industry have focused on operating energy (used for heating, cooling, and lighting). Embodied carbon, which includes emissions from material extraction, production, transportation, and construction, is a frequently underestimated aspect of a building's total environmental effect (Pomponi & Moncaster, 2017). The necessity of decreasing emissions has prompted greater focus on retrofitting existing housing stock, as the bulk of structures that will be in use by 2050 have already been built (Ürge-Vorsatz *et al.,* 2020). Unlike new construction, which allows for the use of energy-efficient designs and materials from the start, existing buildings pose a unique challenge in balancing historical preservation, affordability, practicality, and carbon reduction (Fawcett & Killip, 2019). Despite general agreement on the need for retrofitting, adoption rates remain low due to financial, regulatory, and logistical hurdles (Killip, 2013). Many property owners and landlords may not have access to the required financing or incentives to implement full retrofitting measures, especially when the initial expenses are seen as excessively expensive (Galvin, 2014). Furthermore, retrofit programs have frequently been fragmented, with an emphasis on operational efficiency rather than overall sustainability, limiting their capacity to bring broader environmental and social benefits. For retrofitting to be truly transformative, it must evolve beyond technical energy upgrades and be reframed as an opportunity for ecological and social regeneration (Dixon and Eames, 2013).

2.2 The importance of sustainable retrofitting

While conventional retrofit approaches have primarily aimed at reducing energy consumption, there is growing recognition that these strategies must also address embodied carbon, material circularity, and ecological impact (Cabeza *et al.,* 2014). Traditional retrofitting methods often rely on industrially produced, high-carbon materials, which can reduce operational energy use but contribute significantly to lifecycle emissions (Chastas *et al.,* 2016). For example, the widespread use of cement-based insulation materials or synthetic polymer window frames may improve energy efficiency but simultaneously increase embodied carbon and environmental

degradation (Pomponi & Moncaster, 2017). A shift towards sustainable retrofit materials and approaches is essential. Bio-based and reclaimed materials, such as timber, hempcrete, mycelium insulation, and straw bale, offer significant carbon sequestration potential and can be sourced from local, circular supply chains (Wilkinson & Remøy, 2018). Research suggests that adopting a circular economy approach to retrofitting, where materials are reused and repurposed rather than disposed of, could reduce the built environment's carbon footprint by as much as 50% by 2050 (Gallego-Schmid *et al.,* 2020). Beyond material choices, sustainable retrofitting also requires nature-based solutions, such as green roofs, passive cooling strategies, and water recycling systems, which enhance biodiversity, improve urban resilience, and promote ecosystem services (Franco *et al.,* 2023). However, for these approaches to gain traction, policy interventions and financial incentives must support their adoption. Government-backed retrofit grants, low-interest loans, and carbon taxation schemes could accelerate market transformation, while new building regulations that consider both operational and embodied carbon would ensure that retrofit efforts align with long-term sustainability objectives. The transition towards sustainable retrofitting requires not only technical advancements but also a cultural and behavioural shift towards ecological responsibility (Seyfang & Smith, 2007).

2.3 The role of ecological Citizenship

One of the core barriers to widespread retrofit adoption is the lack of quality engagement with residents and communities. Retrofitting is often implemented via top-down decision-making processes, where tenants and homeowners are passive recipients rather than active participants (Walker *et al.,* 2014). Research has shown that sustainability initiatives are more likely to succeed and have lasting impact when individuals feel a sense of ownership and agency over environmental decision-making (Middlemiss, 2010). This underscores the requirement to cultivate ecological citizenship, where people are actively participating in sustainability efforts at both individual and community levels. As such, ecological citizenship extends beyond legal or economic incentives to encompass civic responsibilities that support long-term environmental resilience (Light, 2006). Citizens who engage in sustainability initiatives, such as energy-efficient home retrofits, material recycling programs, and urban rewilding, lean towards developing stronger pro-environmental values and behaviours (Stern, 2000). Plus, studies indicate that when individuals co-design their living environments, they are more likely to adopt sustainable habits, such as energy conservation, waste reduction, and responsible consumption (Janda, 2011). This participatory approach not only enhances individual sustainability efforts but also works towards fostering collective action, which is critical for addressing systemic environmental challenges (Seyfang, 2010). By embedding community-driven approaches into retrofitting initiatives, policymakers and urban planners could ensure that sustainability measures extend beyond technical interventions and become embedded in everyday habits and life. This aligns with social justice principles, as marginalised communities, who are often most affected by climate change, can have greater agency in shaping their living environments (Shaw, 2012).

2.4 Nature connectedness and the built environment

Another critical but often overlooked dimension of retrofitting is its potential to reconnect people with nature. Urbanisation has led to an increased disconnection from natural

systems, contributing to both environmental apathy and declining mental well-being. Research has detailed that exposure to nature enhances psychological well-being, fosters pro-environmental behaviour, and increases resilience to climate-related stressors (Heilmayr and Miller, 2021). Biophilic design principles for instance, which integrate natural elements into built environments, have been demonstrated to improve indoor air quality, thermal comfort, and occupant satisfaction (Kellert & Calabrese, 2015). Measures such as green walls, daylight optimisation, natural ventilation, and biodiversity corridors, as such not only enhance human well-being but also contribute to broader ecological benefits, such as pollinator habitats, urban cooling, and improved stormwater management (Beatley, 2011). These interventions can be particularly transformative in social housing contexts, where residents often lack access to green spaces but could benefit most from healthier living environments (Wells & Lekies, 2006). Retrofitting with nature-connectedness in mind offers a powerful means of addressing both climate adaptation and human well-being. When combined with community participation, these approaches reinforce Ecological Citizenship, making sustainability an active and experiential practice rather than a passive policy goal (Kibert, 2016).

2.5 Regenerative retrofitting as a holistic solution

Regenerative retrofitting redefines the role of buildings within natural and social systems, shifting from a model that merely reduces environmental harm to one that actively restores ecosystems and strengthens community resilience (Mang & Reed, 2012). Table 1 outlines the elements of regeneratige retrofit, and the way in which the Wildhouse project attends to these areas.

Table 1: Regenerative retrofit themes and the Wildhouse approach.

Elements	Description
Circular Economy & Biodiversity	Regenerative retrofitting integrates circular economy principles and biodiversity restoration, creating built environments that contribute positively to both ecological systems and social well-being. The Wildhouse case study explores how these principles manifest in practice.
Materials, Nature, and Engagement	By emphasising the use of low-carbon, bio-based, and reclaimed materials, regenerative retrofitting goes beyond technical solutions to address deeper systemic transformations. The Wildhouse project serves as a test case for exploring how materials, nature, and community engagement foster sustainable urban living.
Low-Carbon, Bio-Based Materials	The use of low-carbon, bio-based, and reclaimed materials reduces embodied carbon and promotes circularity in the construction sector. These materials enhance thermal performance and occupant health, as demonstrated in the Wildhouse retrofit.

Nature-Based Solutions	Nature-based solutions, such as green roofs, rain gardens, permeable surfaces, and passive ventilation systems, improve climate resilience and create habitats for biodiversity. The Wildhouse project demonstrates how these solutions are integrated into retrofit projects.
Health and Pro-Environmental Behaviour	Nature-based interventions improve physical and mental health, foster pro-environmental behaviours, and enhance social sustainability. The Wildhouse case study explores how these outcomes manifest in a residential retrofit context.
Community Participation and Co-Design	Grounding retrofitting in co-design and community participation ensures contextually appropriate solutions and fosters a sense of ownership and environmental stewardship. The Wildhouse project is guided by participatory processes, central to evaluating the social impacts of the retrofit.
Sustainability and Social Cohesion	Participatory sustainability initiatives, like the co-design approach at Wildhouse, lead to long-term engagement, increased pro-environmental behaviours, and strengthened social cohesion. This hypothesis is explored through the community's involvement in the retrofit.
Social and Ecological Equity	Integrating participatory governance with ecological design ensures that sustainability transitions are both inclusive and empowering, aligning ecological restoration with social equity. The Wildhouse project investigates how this integration affects the residents' experience.
Transforming Housing	Regenerative retrofitting transforms housing into sites of ecological regeneration and social transformation, positioning homes as active contributors to climate resilience and community well-being. This hypothesis is tested by examining how the Wildhouse retrofit creates new roles for domestic properties.

2.6 Approach: Advancing the role of regenerative retrofitting

Despite the clear advantages, the integration of nature-based solutions into retrofit projects remains inconsistent, largely due to fragmented policy support and a lack of standardized design guidance. To build a stronger case for their inclusion in regulatory frameworks and incentive schemes, it is crucial to demonstrate the multi-functional benefits of nature-based retrofit interventions through pilot projects and evidence-based research.

One of the most transformative aspects of regenerative retrofitting is its ability to actively engage communities in co-creating sustainable housing solutions. Historically, retrofitting has been a top-down process, with interventions imposed on buildings and residents with little to no meaningful involvement. In contrast, a regenerative approach positions residents as key stakeholders in shaping their living environments. Recognizing the importance of participatory design, this approach fosters long-term engagement, strengthens social cohesion, and cultivates a deeper sense of ecological responsibility. Community-led retrofit initiatives not

only enhance the social impact of sustainability transitions but also provide invaluable insights into context-specific design adaptations, ensuring that interventions are both functionally effective and culturally relevant.

For regenerative retrofit approaches to move beyond theory and into widespread implementation, robust case studies are essential to demonstrate their feasibility and scalability. This is where experimental projects like Wildhouse play a critical role. By applying regenerative principles to real-world retrofit scenarios, these projects offer a platform for testing innovative materials, assessing ecological impacts, and refining participatory engagement models. The insights derived from such case studies can guide broader policy and industry transitions, paving the way for the integration of regenerative principles into mainstream housing retrofit strategies. As the urgency of climate action grows, it is vital to shift beyond conventional retrofit models and adopt approaches that are not only sustainable but truly regenerative. Scaling up regenerative retrofitting requires concerted efforts across research, industry, and policy, supported by real-world examples that clearly demonstrate the tangible benefits of these approaches. The Wildhouse project, as an active case study, exemplifies this shift by showing how homes can become agents of ecological and social regeneration, rather than simply energy consumers.

The authors of this study are embedded design researchers actively involved in the Wildhouse project. In our roles, we serve as facilitators of participatory processes, observers, and contributors to the co-design of retrofit elements. Our engagement with other designers in this space has been central to ensuring that the retrofit interventions are reflective of the aspirations of a regenerative retrofit approach. This process has included running design workshops, conducting informal interviews, and engaging in material prototyping and speculative design exercises.

3. Wildhouse

The *Wildhouse* project (Gant, Eldridge, Tooze, 2024) in Brighton represents an approach to regenerative retrofitting, demonstrating how housing can move beyond energy efficiency and carbon reduction to actively contribute to ecological and social regeneration. Situated within the Brighton and Lewes Downs UNESCO Biosphere Reserve, *Wildhouse* challenges the dominant extractivist model of construction, offering an alternative vision where homes function as dynamic interfaces between people and the natural world. By embedding regenerative design principles within an urban social housing context, the project showcases how ecological restoration and community participation can be integrated into the retrofit process.

Figure 1. The WildHouse retrofit of the Brighton Waste House, mixed species and sized timber cladding and dye garden for the development of wood stains, dyes and paints for the house. Images Nick Gant.

Unlike conventional retrofitting approaches that prioritise technical efficiency, *Wildhouse* looks to imagine housing as a living system inextricably linked to the landscapes from which its materials are sourced. The project is installed in the established Brighton *Wastehouse* (Baker-Brown, *et al.,* 2013). The *Wastehouse* was built by community volunteers and local trainee tradespeople and is constructed from the waste that other building sites throw away. The new Wildhouse regenerative retrofit further enhances Wastehouse's circular economy credentials by providing insight into the possibilities of turning an ordinary home into an immersive, interactive space that fosters ecological awareness and agency among its residents. It challenges the assumption that regenerative design is a luxury reserved for high-end architecture or niche communities, instead advocating for its widespread adoption within social housing. At its core, *Wildhouse* seeks to redefine retrofitting as an inclusive and participatory process, ensuring that the benefits of nature-first design are accessible to all.

A central feature of *Wildhouse* is its commitment to using Making Nature Principles (MNP) (Gant & Laffiansyah, 2020) where the design and making methods seek to more clearly define how and where materials may provide landscape improvement and the potential for increased diversity. These materials not only store carbon but also improve indoor air quality and foster healthier living environments and (it is hoped) those of other forms of nature. The relationship between the domestic space and the landscape from where the house is sourced is deliberately enhanced and amplified through the design of the objects as an 'Ecology of Things' [EoT] (Gant, *et al.,* 2024).

Figure 2. Mixed species timber kitchen and rammed chalk wall with chalk ammonite listening device. This image documents a co-design experiment with residents, showcasing a mixed-species timber kitchen and a rammed chalk wall integrated with a chalk ammonite listening device. The device beams live sounds from the chalk 'dew pond' located at the South Downs Waterhall rewilding site, creating an immersive connection between the domestic space and the surrounding landscape. This sensory experience invites reflection on materiality, local ecology, and the potential of integrating natural elements into the home. Image: Nick Gant.

Objects and interactions within the space use both digital and material means to enhance this connectivity. For example, a rammed chalk wall is linked to a chalk dew pond dug into the South Downs chalkland that provides a thriving habitat for nature. By using hydrophones connected to an ammonite 'telephone' in the house users can hear the live sounds of activity below the surface of the pond. An orthodox array of kitchen cupboards demonstrates how mixed species, ages, and dimensions of wood, sourced from more diverse, less monocultured woodlands can provide both an aesthetic benefit resulting from better woodland management (Gant, *et al.,* 2024). Open a kitchen door and it also provides a chorus of birdsong sourced from the same healthy, woodland as the materials. By demonstrating the viability of nature-based, circular solutions within a real-world housing context, *Wildhouse* signposts practices that could be (re) interpreted across the social housing sector. The project highlights how regenerative design is not simply an aesthetic or ideological choice but a practical strategy for reducing carbon emissions, conserving resources, and creating healthier, more resilient living environments. Moreover, it provides tangible, everyday interactions and a more relatable environment through which to propagate Ecological Citizenship and proposes more direct engagement between people and the wider environment that may benefit from regenerative retrofitting.

Figure 3. Augmented reality kitchen and binoculars. In this co-speculative design experiment, augmented reality technology and binoculars offer residents access to moving images and sounds from a woodland environment benefiting from rotational timber resource management. This interaction enables a deeper engagement with the sustainable practices behind the materials used in the retrofit, sparking discussion about ecological systems and the role of timber management in housing design. The image illustrates how technology can be used to provoke thought on environmental connections within the home. Image: Nick Gant.

Unlike top-down retrofitting schemes that impose solutions on residents, *Wildhouse* actively involves stakeholders in shaping the living environment. Through co-design workshops, residents, service providers and suppliers collaborate with designers, ecologists, and material innovators to envision homes that reflect their values and aspirations. These workshops explore how regenerative resources, objects, and interfaces can forge meaningful, educational, and joyful relationships between people and nature, ensuring that sustainability is not only practical but also desirable.

Wildhouse serves as a testbed for exploring the feasibility of integrating regenerative design into mainstream housing policy and supply chains. Through collaborations with local councils and other key stakeholders, the project generates critical insights into the economic, ecological, and social viability of regenerative retrofitting. It raises fundamental questions about the accessibility of regenerative materials and design processes, challenging the assumption that such approaches are only viable within high-end, bespoke architectural projects.

One of the project's key research inquiries is whether nature-prioritised products and materials can be integrated into mass social housing supply chains, or whether they remain confined to the margins of design culture. Additionally, *Wildhouse* examines how social housing providers can leverage regenerative resourcing methods to meet

legislative requirements for carbon reduction, local employment, and biodiversity net gain. By aligning ecological regeneration with pressing policy and economic considerations, *Wildhouse* positions regenerative retrofitting as a practical, future-proofing systemic opportunity. Through its participatory approach, the project seeks to cultivate a community of practice around regenerative design, engaging social housing tenants, policymakers, and industry stakeholders in a shared vision for ecological living. It also produces critical insights into the desirability, feasibility, and real-world impact of regenerative housing, generating data that can inform future policy and investment decisions.

Figure 4. Wild House work in progress of regenerative retrofit. Image Nick Gant.

4. Implications for Ecological Citizenship and retrofit

One of the most profound contributions that Wildhouse aims to make is its ability to embed ecological citizenship directly into the everyday lives of homeowners and residents. Traditional sustainability initiatives often frame environmental responsibility as abstract, distant actions, such as reducing emissions or supporting biodiversity through conservation efforts, that can feel detached from daily life. Wildhouse, however, seeks to bridge this gap by demonstrating that Ecological Citizenship can be cultivated through direct, material interactions within the home. By situating regenerative design within social housing, the project ensures that ecological engagement is not confined to a privileged few but is made accessible to a wide and diverse range of residents, many of whom may have had limited exposure to sustainability practices. This approach is particularly significant because it goes beyond the typical “green” design elements seen in conventional housing. Instead of relying solely on energy-efficient technologies or superficial sustainability measures, Wildhouse creates an immersive, sensorial

experience within the home. For example, the use of locally sourced, natural materials and the integration of nature-based solutions like green walls and rain gardens allow residents to experience and interact with the ecosystems that sustain them. This tangible connection shifts sustainability from a passive awareness of environmental issues to active participation, where residents are encouraged to see themselves as part of a larger ecological system. It fosters a sense of stewardship and a long-term commitment to ecological principles, turning sustainable living into a lived, everyday practice.

In addition to cultivating ecological responsibility, the project also empowers residents by involving them directly in the design process. The co-design and participatory elements of Wildhouse challenge the traditional top-down approach to social housing retrofits, which often exclude residents from the decision-making process. By positioning residents as active participants, Wildhouse ensures that the design of their homes is informed by their lived experiences and needs. This inclusive approach helps to create a sense of ownership, encouraging residents to take personal responsibility for sustainable living practices. More importantly, it promotes a deeper, more meaningful engagement with the space they inhabit, transforming their homes into dynamic ecosystems that support both human and non-human life.

Beyond its impact on residents, Wildhouse reimagines what regenerative retrofitting can achieve. Instead of solely focusing on energy efficiency, it broadens the scope to actively restore ecosystems, enhance biodiversity, and create spaces that support human well-being. By looking at retrofitting from this expanded perspective, the project offers valuable insights for housing policy and urban sustainability. If adopted at scale, regenerative retrofitting could shift the construction industry away from its traditional linear, extractive model towards a more circular, place-based approach. This approach would not only reduce the environmental footprint of buildings but also offer opportunities for new economic and social value, such as local material supply chains, community-driven innovation, and nature-based employment opportunities. In doing so, it shows how regenerative retrofitting can be a driver of both ecological and social transformation.

Moreover, Wildhouse directly addresses the common misconception that regenerative design is too costly or impractical for widespread adoption, particularly within social housing. The project demonstrates that regenerative retrofitting can be both economically viable and socially beneficial when framed as an investment in long-term resilience, rather than as a mere upfront cost. By working closely with local authorities and social housing providers, Wildhouse aims to show that ecological restoration can be aligned with existing policy frameworks, such as Local Nature Recovery Strategies (LNRS) and Biodiversity Net Gain (BNG). This alignment not only makes regenerative retrofitting more accessible but also proves that ecological sustainability can be integrated into mainstream housing strategies without compromising affordability or social equity.

However, scaling regenerative retrofitting requires overcoming significant institutional inertia, shifting industry habits, and fostering collaboration across sectors. Traditional procurement processes often prioritise short-term cost savings over long-term ecological benefits, limiting the scope for sustainable interventions. Wildhouse highlights the need for a new approach to procurement—one that considers the full lifecycle impacts of materials and demonstrates how regenerative design can create social and environmental co-benefits. By engaging policymakers, housing providers, and supply chain actors in the design and implementation process, the project offers a practical pathway for integrating regenerative practices into mainstream housing strategies.

Rather than positioning Wildhouse as a generalisable model, we frame it as a situated

experiment in regenerative design practice. Through the co-design process, the project reveals how residents engage with and commit to more sustainable futures. The insights gained from these situated experiences offer a deeper understanding of how people interact with their homes, perceive their built environments, and shape them in ways that align with ecological principles. This approach makes the implications of regenerative retrofitting more tangible, grounded in the specific context and experiences of the residents, and helps illustrate how design can actively support the cultivation of Ecological Citizenship. Ultimately, Wildhouse serves as a valuable case study that underscores the potential of regenerative retrofitting to transform homes into active agents of ecological and social regeneration, grounded in the lived realities of the people who inhabit them.

Table 2. Implication of regenerative retrofit- informed by *Wildhouse*

	Implications of Regenerative Retrofitting
Ecological Citizenship	Regenerative retrofitting could foster deeper connections between people and their environment by integrating nature into everyday living, encouraging stewardship and sustainable behaviours.
Beyond Energy Efficiency	Unlike conventional retrofitting, which focuses on reducing energy use, regenerative approaches could enhance biodiversity, restore ecosystems, and promote circular material flows.
Scalability & Policy Influence	Demonstrating successful regenerative retrofits could inform housing policy, influencing large-scale implementation and regulatory support for nature-based solutions.
Social Housing & Equity	Regenerative retrofits could ensure that sustainable, nature-integrated design is accessible to all, reducing the gap between eco-conscious housing and social housing sectors.
Community-Led Design	Engaging residents in co-design processes could lead to more contextually relevant solutions, fostering a sense of ownership and long-term commitment to sustainable practices.
Holistic Well-Being	By incorporating natural materials, biophilic design, and ecosystem services, regenerative retrofitting could improve mental and physical health outcomes for urban populations.
Future-Proofing Urban Spaces	As climate resilience becomes critical, regenerative retrofits could provide adaptive, low-impact solutions that benefit both people and the planet.

5. Informing the future

Informed by this discussion and the *Wildhouse* project, a primary area for future research could involve understanding how the principles of ecological citizenship evolve over time when residents are embedded in regenerative living environments. While *Wildhouse*

introduces this concept in a tangible way, long-term studies are needed to assess the depth and sustainability of ecological engagement as well as the impacts of resourcing in the (resourcing) landscape. Research could track how residents' relationships with nature develop, moving from abstract awareness of environmental issues to active engagement with the environment. This could include further studies into how the scale and demand for social housing may stimulate disruptive models for better landscape management and resourcing and the potential for the delivery of Biodiversity-Net-Gain through social housing resourcing models itself rather than landscaping and offsetting. By examining the social dynamics of communities living in regenerative homes and their appreciation (or not) of more ‘natural’ interactions, researchers could identify key drivers of long-term behavioral shifts, informing strategies for fostering wider Ecological Citizenship beyond the boundaries of the individual home. However, the long-term ecological benefits of such interventions need to be accurately assessed. Future research could track changes in local biodiversity and ecosystem health as a result of regenerative retrofitting. This would involve long-term ecological monitoring, looking at factors such as wildlife populations and air quality over time. Understanding the broader ecological impacts of these designs, and comparing them with more traditional approaches, could build a compelling case for adopting regenerative practices at a larger scale, influencing urban planning and policy frameworks.

One critical challenge to scaling regenerative retrofitting is economic viability, particularly in social housing contexts. The initial perceptions of high costs often hinder the uptake of nature-based solutions. However, as presented here, regenerative retrofitting could offer long-term savings in terms of maintenance and energy use, if framed as an investment in resilience and better programmed and collaborative use of landscape resources that are undermanaged. Future research could delve deeper into the financial models that would make regenerative retrofitting economically feasible at scale. Additionally, research could explore alternative funding mechanisms, such as community-based financing and agribusiness models, to make these practices more accessible to low-income and marginalised communities.

Figure 4. Wild House - Materials and resource site sample book. Image Nick Gant.

As noted above, institutional inertia within the construction and housing sectors presents a significant barrier to scaling regenerative retrofitting. Future research could further highlight mechanisms to overcome the institutional barriers that inhibit the adoption of these practices. This includes examining procurement processes, regulatory frameworks, data-sharing, collaborative stockpiling and the lack of joined-up mindset of industry stakeholders who may prioritise short-term cost and speed over long-term ecological and social benefits. Research could investigate new models for policy and procurement that 'value' regenerative design, highlighting successful case studies where such models have been implemented. Additionally, exploring how these frameworks can be integrated into existing urban policies, such as those relating to climate resilience and biodiversity, could provide a pathway for shifting industry norms and institutional behaviors towards more sustainable practices.

On a broader scale, future research could explore how regenerative retrofitting practices can be adapted to different cultural and geographical contexts. *Wildhouse's* impact could be more widely understood by comparing how similar principles of ecological design are implemented in various global regions. Cross-cultural research could highlight region-specific challenges, from climate considerations to local construction practices, providing a more nuanced understanding of how regenerative retrofitting can be adapted and scaled across diverse contexts. This transnational exchange of knowledge could play a critical role in shaping global standards for regenerative housing and fostering international collaboration on sustainability initiatives.

6. Conclusion

Regenerative retrofitting represents a transformative shift in how we approach sustainable housing, offering a solution that looks to extend beyond energy efficiency and carbon reduction to actively contribute to ecological and social regeneration. By integrating nature-based solutions, circular material strategies, and participatory design, regenerative retrofitting offers a redefinition of the role of buildings within natural systems, transforming them from passive structures into active participants in ecological renewal. This approach forefronts the use of bio-based materials, promotes potential pathways to biodiversity, and fosters a tangible connection between residents and their ecosystem. Regenerative retrofitting also opens pathways to Ecological Citizenship by engaging communities in the design and implementation and even long-term monitoring of their environment and the broader ecosystems they inhabit. This participatory approach not only improves the physical infrastructure but also provides a route to strengthen social cohesion, hopefully encouraging long-term commitment to sustainability and environmental stewardship. By moving beyond conventional retrofit models that prioritise operational efficiency, regenerative retrofitting highlights the importance of embodied carbon reduction, biodiversity enhancement, and the creation of resilient, nature-integrated urban environments.

Additionally, regenerative retrofitting attends to practical and scalable solutions to the pressing challenges of climate change, biodiversity loss, and social inequality where it is needed most. By generating a demonstration that sustainable housing can be both affordable and accessible, this approach challenges traditional notions of retrofitting as only open to the able-to-pay and instead paves the way for its widespread adoption in social housing and beyond. The *Wildhouse* project signals how regenerative retrofitting might be implemented within social housing, offering a model that blends ecological restoration with community empowerment. Ultimately, regenerative retrofitting has the potential to catalyse a broader cultural and policy shift towards more sustainable, resilient, and community-centred urban living. This model presents an opportunity to bridge the gap between environmental responsibility and social equity, creating spaces that contribute positively to both human well-being and ecological restoration.

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Research of the Spatial Form of Shanxi PiaoHaoMuseum under Space Syntax

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1. INTRDOUCTION

KeyWords: Space Syntax;Ancient City of PingYao;PiaoHao Museum;Spatial Form;Functional Transformation.

Traditional architectural spaces preserve urban history, exemplified by Shanxi's Jin merchant culture and Pingyao's PiaoHao draft banks. Existing studies focus on qualitative spatial-commercial links but neglect quantitative spatial-visitor dynamics.
This research employs Space Syntax to analyze the PiaoHao Museum's spatial-function interplay, aiming to optimize heritage conservation and integrate historical spaces into modern urban contexts.

2.LITERATURE REVIEW

Space Syntax Theory: Space Syntax analyzes spatial organization and socio-cultural linkages through quantitative methods. It reveals how architectural/urban forms align with socio-economic factors, enabling predictive insights for conserving and optimizing traditional spaces.

Application of Space Syntax in Traditional Architectural Space : Space Syntax reveals socio-spatial hierarchies in global cases. China's research highlights practical applications but limited exploration in museum adaptation. This study bridges gaps via quantitative analysis of Shanxi's PiaoHao spatial evolution.

3.METHODOLOGY

①Space Syntax Analysis → ②Spatial Segmentation → ③Visitor Behavior Observation

Research on Spatial Form of the PiaoHao Museum

- The Etiology of PiaoHao Spatial Formation
- Types of PiaoHao Spatial Structure
- Constituent Elements of PiaoHao Spatial Structure

Qualitative Analysis

Historical Periods of PiaoHao
- ①Spatial Determination
- ②Quantitative Drawings

Historical Periods of PiaoHao Museum

Spatial Syntax Software: Depthmap
- Convex Space Analysis: Characteristics of Spatial Layout
- Viewshed Analysis: Spatial Function and Flow Line Characteristics

Regularity\Variability\Spatial Logical Transformation
- ①Diagrams of Space
- ②Comparison of Data
- ③Correlation Analysis

④Topological Analysis → ⑤Visual Field Analysis → ⑥Socio-Spatial Interplay

4.RESEARCH CONCENT

PiaoHao Spatial Typologies: Commercial-Residential Transformation.

Using Space Syntax and Depthmap, this research analyzes Pingyao's Rishengchang and Weifenghou PianHao. Historical museum comparisons reveal commercial-residential zoning and axial layout impacts on visitor flow, relecting Jin merchant ethics.Quantitative insights propose conservation strategies for adaptive reuse and cultural continuity.

5.RESULTS AND DISCUSSION

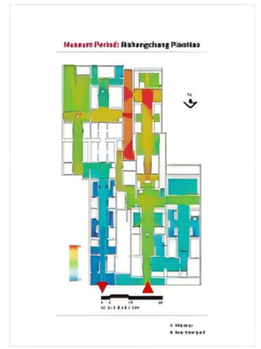
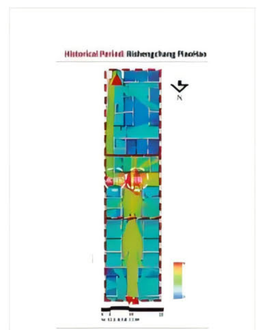
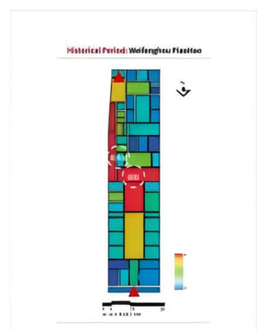
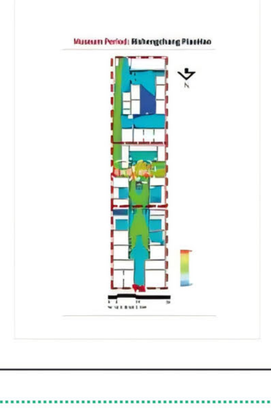
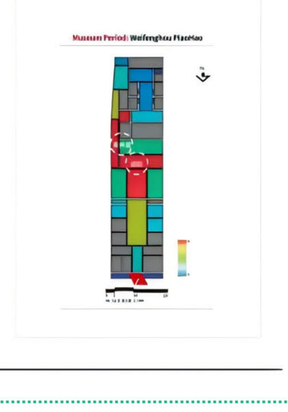
PiaoHao spatial layouts in Pingyao reflect socio-cultural logic: Commercial adaptations prioritize open business operations, while residential conversions emphasize privacy, isolation, and functional segregation.

Rishengchang PiaoHao

	Spatial	Historical	Modern		Spatial	Historical	Modern
A1	Rishengchang Entrance	0.73	0.41	A9	Central Hall	0.93	0.41
A2	Eastern Shopfront	0.65	--	A10	Eastern Manager's Chamber	0.65	0.52
A3	Western Shopfront	0.65	0.36	A11	Western Manager's Chamber	0.65	0.52
A4	Eastern Counter Room	0.55	--	A12	Rear Courtyard	0.55	0.69
A5	Western Counter Room	0.55	0.34	A13	Kitchen	0.55	0.56
A6	Accounting Room	0.65	0.44	A14	Guest Rooms	0.65	0.56
A7	Correspondence Room	0.65	0.44	A15	Rear Hall	0.65	0.58
A8	Front Courtyard	0.97	0.50	A16	Passageway	0.97	0.78
	Spatial	**Historical**	**Modern**		**Spatial**	**Historical**	**Modern**
B1	Rixinzhong Entrance	0.51	0.38	B5	Western Counter Room	0.55	--
B2	Front Courtyard	0.70	0.44	B6	Accounting Room	0.54	0.37
B3	Western Shopfront	0.51	--	B7	Correspondence Room	0.54	0.37
B4	Eastern Counter Room	0.55	--	B8	Southern Hall	0.64	0.41
	Spatial	**Historical**	**Modern**		**Spatial**	**Historical**	**Modern**
C1	Weitaihou Exit	--	0.60	C9	Accounting Room	--	0.43
C2	Eastern Shopfront (Gift Shop)	--	0.33	C10	Correspondence Room	--	0.43
C3	Western Shopfront	--	0.36	C11	Second Courtyard	--	0.51
C4	Counter Room	--	0.36	C12	Passageway	--	0.59
C5	Vault	--	0.36	C13	Rear Courtyard	--	0.70
C6	Student Quarters	--	0.40	C14	Rear Courtyard Passage	--	0.52
C7	Field Agent Room	--	0.40	C15	Third Courtyard	--	0.74
C8	First Courtyard	--	0.42	C16	Restroom	--	0.44

Weifenghou PiaoHao

	Spatial	Historical	Modern
D1	Entrance	0.79	0.61
D2	Eastern Shopfront	0.58	--
D3	Western Shopfront	0.64	--
D4	Outer Courtyard	0.97	0.80
D5	Eastern Wing Room of the Outer Courtyard	0.75	0.60
D6	Western Wing Room of the Outer Courtyard	0.75	0.60
D7	Passageway	0.75	0.60
	Spatial	**Historical**	**Modern**
E1	Anterior Courtyard	1.10	0.96
E2	Eastern Wing Room	0.73	0.69
E3	Western Wing Room	0.75	0.69
E4	Courtyard	1.16	1.06
E5	Main Hall	0.75	0.74
E6	Eastern Alleyway	1.15	1.04
E7	Utility Room	0.82	--
E8	Annex	0.75	--
	Spatial	**Historical**	**Modern**
F1	Courtyard	0.74	0.87
F2	Main Hall	0.72	--
F3	Rear Courtyard	0.55	--
F4	Eastern Wing Room	0.76	0.80
F5	Western Wing Room	0.62	0.60
F6	Courtyard of the Southern Hall	0.62	0.60
F7	Servants' Quarters	0.88	0.79
F8	Southern Hall	0.58	--
F9	Fú Character Courtyard	0.62	0.59
F10	Rear Main Gate	0.99	0.89

Spatial Types	Spatial Plans	Visual Field Analysis	Convex Space Analysis
Rishengchang Historical Period			
Rishengchang Museum Period			
Weifenghou Historical Period			
Weifenghou Museum Period			

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Shared Ownership in School Zones: Non-Formal Education Through Placemaking and Participatory Design

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ABSTRACT |
Rethinking urban spaces for local communities in dense city centres is crucial but complex. High-density areas often favour commercial and infrastructural needs over community spaces, limiting areas for social interaction, greenery, and sustainable mobility. Transforming such spaces to support local needs fosters community identity, well-being, and inclusivity but demands creative, conflict-free solutions that navigate regulatory and financial constraints while respecting cultural diversity. This paper presents a 2.5-year research project applying placemaking and participatory design to co-create shared ownership of a school-front area in Budapest.
School fronts, just like liminal spaces, are "at the boundary of two dominant spaces, which is not fully part of either" (Dale and Burrell, 2008: 238), functions of school front areas are not easily defined just like their ownership by a specific group and these are the spaces where anything can happen (Turner, 1974 cited by Shortt, 2015). The research aims to explore how social design might facilitate children's physical and mental safety regarding the inclusivity of public places through placemaking. It has been conducted by a Hungarian design university in collaboration with external experts of different disciplines, such as pedagogy, child participation, environmental psychology, road traffic and public transport as well as the local municipality as decision makers. The paper illustrates a participatory design process, using methods (cognitive mapping, persona building, brainstorming ect) that actively engage students (age group 10-13) and school teachers in developing inclusive safe school zones tailored to the needs and perspectives of young people as well as other user groups. By collaborating in the design process, children learned about inclusivity, safety, and accessibility in urban planning. This approach not only encouraged the development of safe, child-friendly spaces but also educated participants in a non-formal way on the value of public spaces that are inclusive and responsive to diverse needs (Freeman & Tranter, 2011; Ellery & Ellery, 2019).

Results show that the educational potential of this approach is significant, as it introduces for children an early understanding of urban planning and the principles of safe, inclusive design. By working together with designers, urban planners, and decision makers, students gained insight into the challenges and possibilities of transforming urban spaces, experimenting critical thinking, cooperative design and creativity.

KEYWORDS | URBAN PLACEMAKING, PARTICIPATION, INCLUSIVE SPACES, SCHOOL ZONES, SHARED OWNERSHIP

1. Introduction

Urbanisation has led to the rapid development of densely populated cities around the world, creating a complex set of challenges and opportunities for residents, urban planners and policy makers. While cities serve as hubs of economic activity, cultural exchange and technological innovation, they also bring with them significant challenges in terms of environmental sustainability, infrastructure congestion, housing affordability and social inequalities. Among these concerns, the issue of common ownership of public spaces and boundaries remains a critical but still underexplored issue in contemporary urban studies. The challenges of densely populated cities are evident at different scales, from global metropolises such as Tokyo, New York and Hong Kong, to medium-sized capitals such as Paris and Barcelona, and even smaller urban environments such as Valletta. As public spaces are transformed into sites of economic activity and tourism, their function as inclusive, community-centred environments is increasingly under threat. The resulting fragmentation of ownership over public spaces not only reflects socio-economic inequalities, but also contributes to a wider sense of isolation and alienation among residents. Without a strong sense of belonging, the participation of citizens in urban community maintenance and development efforts is reduced, adding to issues of neglect and spatial exclusion.

This paper examines the dynamics of shared ownership in bounded spaces, with a particular focus on a case study in Budapest. Through a three-year interdisciplinary research project, the paper explores how placemaking and participatory design can increase children's physical and mental visibility and safety in public spaces, particularly in school front areas. Involving students, teachers, parents and local residents, the research seeks to understand how urban design can promote inclusion, strengthen communities and foster a sense of belonging in urban boundary spaces. The results of the study contribute to the broader discourse on urban spatial justice, emphasising the need for participatory planning strategies that prioritise community-led interventions over commercial and regulatory constraints. Ultimately, promoting shared ownership in dense urban environments requires a reassessment of how public spaces are designed, managed and experienced, ensuring that they remain accessible, adaptable and representative of the diverse communities they serve.

2. Dense cities of our age

2.1. Scale-neutral challenges

The comparison of the effects of urban and rural environments has been a much discussed area of research (Verheij 1996, Verheij et al. 2008, Bernhard et al. 2013, Ma et al. 2020). Among the myriad challenges of metropolitan life are air and noise pollution, congestion, unprocessable stimuli, crime, alienation, the emergence of cumulative social problems (homelessness, poverty, etc.) and the decline of green spaces (Marsell 1988, cited in Dúll 2017). When mapping the impact of these issues, the connections between the environment and communities is an important aspect. They are deeply intertwined and therefore in constant discourse and shaping process. By bringing together people, infrastructure, and resources these close, dense cities face even more specific challenges connected to the areas of traffic, housing, environmental sustainability, public health, infrastructure and social inequality. Housing affordability for example remains a central concern among these cities, with extremely high real estate prices pushing lower-income residents to the margins or into inadequate housing conditions.
High-density can look rewarding for citizens, however it has its downsides as well. There is a high risk that communities will become isolated, the vertical and compact nature of high-density living can limit spontaneous social interactions and reduce access to

shared public spaces, which are essential for building community ties. Therefore cities need a good strategy for fostering inclusivity, participatory actions and accessible urban spaces for all (Lydon & Garcia 2015; Hamdi 2004). Placemaking is an approach that has become an often used tool for highlighting the importance of participation, when it comes to how to involve the local community in shaping their environment (Silberberg et al. 2013). In order to transform scale-neutral challenges - including affordability and access - into opportunities, a certain shift is needed in moving from top-down executive planning to community-based, bottom-up engagement to enhance community empowerment and urban renewal.

Public transport systems, though often highly developed, struggle to accommodate the daily influx of commuters, resulting in severe overcrowding and long wait times. Additionally, environmental issues, including air pollution and urban heat islands, exacerbate the already challenging living conditions. The phenomenon brings different aspects of challenges in different contexts of not only huge metropolitans (with 7+ million habitats) like Hong Kong, Tokyo, New York and London but also medium sized capitals (with 2-3 million habitats) as well such as Paris and Barcelona or even smaller cities (less than 10.000 habitats) like Valletta.

In metropolitan areas such as Hong Kong, Tokyo, Mumbai, New York City, São Paulo, and London, the consequences of high-density urban living are widespread and multifaceted. For instance, Tokyo's density necessitates strict seismic safety regulations due to the constant risk of earthquakes, yet the city's density creates spatial and social pressures (Sorensen 2002). Similarly, New York City faces the dual threats of climate change and aging infrastructure, making urban management even more challenging. These happenings are leading to seek out solutions to a more resilient and inclusive urban setup, therefore participatory planning and community-driven approaches became critical tools for change. These programs - such as “Rebuild by Design” - are aiming to highlight the voice of the community in the urban planning discourse, while demonstrating the power and possibilities of inclusive governance (Rosenzweig et al. 2011). Traffic congestion and pollution are ongoing problems, and the city faces increasing risks from climate change, particularly due to rising sea levels and extreme weather events (Rosenzweig et al. 2011). Amongst many cities, the example of Hong Kong illustrates the limited land availability leading to extreme vertical urbanisation (Yeh & Yuen 2011) which affects social connections negatively (Dúll 2009). The already mentioned challenge of lacking affordable housing led to the development of informal settlements in Mumbai. Additionally, Mumbai also experiences frequent flooding during monsoon seasons due to poor drainage infrastructure (Gupta 2009). One of São Paulo’s primary challenges is urban sprawl, creating both overcrowded areas and inefficient land use (Caldeira 2000).

In Paris and Barcelona, density poses specific problems and advantages which can be addressed by urban planning in medium-sized cities. Although these cities have historical advantages and moderate urban forms, they are also facing the same issues of housing unaffordability, high rents, and overcrowding that characterize the larger metropolises. In Paris, limited space, zoning restrictions, and the lack of available land present a challenge regarding the provision of affordable housing. Tourism is also a major issue in Barcelona, which increases congestion, while the need for short-term rental properties for tourists worsens the housing shortage for locals. Both cities also face the issue of density versus the environment. The problem of the urban heat islands is growing due to underprovision of green spaces, while the whole infrastructure does not adapt fast enough to the increasing needs of people and visitors. These problems show that new urban policies are needed to address important issues of equity, sustainability, and environmental sustainability as population increases, to which placemaking can bring solutions

including inclusive zoning policies, public place protection, regaining local spaces and co-designing new and improved neighbourhood amenities (Touati-Morel 2015, Staricco & Vitale Brovarone 2022).

Small towns, even if they are more manageable in size, cannot hide from the pressures of high-density life. Cities such Valletta are facing severe land shortages and rapid population growth, adding to the challenges of overcrowding and limited public space. These small cities, often unable to replicate the infrastructure and governance models of larger metropolises, are finding it difficult to properly address these problems. In many of these areas, informal urbanisation leads to the development of slums or substandard housing, where lower income groups face poor living conditions. In addition, the lack of accessible public spaces and community facilities contributes to a growing sense of socio-economic segregation. Moreover, the environmental stress resulting from overcrowding puts enormous pressure on resources such as water, sanitation and energy (Thake & Hall 1993). These cases represent that exclusionary dynamics may show up not only in larger cities, but small towns struggling with the realisation of real inclusiveness. Predefined participatory frameworks might help to avoid such deadends and design to fit for local contexts, with the inclusion of marginalized communities as well in order to foster the real sense of shared place and work against any form of segregation.

The very extensive urban challenges of our days may vary regarding their contexts and scales, however their impact is always greatly formed by the nature of the participatory action. The many recent cases show that urban complexity can only be tackled by incorporating participation and a special attention to inclusiveness in order to create more resilient urban environments.

2.2. Towards shared ownership of boundary spaces

Besides the above mentioned several challenges of highly dense urban environments, the sense of ownership over public spaces among local residents is often weakened due to overcrowding, extreme diversity of users, and commercial pressures. The competition for space limits the ability of local communities to use public areas for social and cultural activities. Moreover, public spaces in modern, dense cities serve multiple functions, serving not only local communities but also tourists, commuters transforming public spaces into commercialised zones (Mehta 2014). Besides tourists and investors, we also have to be aware of underrepresented, marginalised or even sometimes invisible groups (such as elderly people, children, migrants, homeless people), who might be a minority according to the user population but still have the need for informal gatherings and open space usage (Chuang & Chen 2022). As a result, many residents can feel disconnected from these spaces, perceiving them as areas of temporary occupation rather than as extensions of their own neighborhoods: they do not have the opportunity to shape and use these areas freely. When public spaces are designed primarily to accommodate economic or aesthetic interests rather than the everyday needs of the local population, they lose their capacity to foster a sense of belonging and ownership. This lack of emotional and social attachment reduces civic engagement and the willingness to contribute to the maintenance and protection of these spaces (Wood, Frank & Giles-Corti 2010).

The fragmentation of ownership over public spaces is also linked to socio-economic inequalities and cultural differences in urban populations. In many densely populated cities, particularly in developing economies, rapid urbanisation has led to an uneven distribution of well-maintained public spaces. While wealthier communities have access to exclusive parks and recreational areas, lower-income residents rely on overcrowded and underfunded public infrastructure. This inequality not only creates tensions over the

use of space, but also reinforces social divisions, and public spaces become sites of exclusion rather than inclusion. Moreover, in politically charged environments, public spaces have become the site of social movements and protests, further challenging their role as neutral and inclusive urban public spaces.

The challenges as well as the opportunities of shared ownership are concentrated in the boundary spaces of urban environments. Liminal spaces play a crucial role in shaping how people perceive and relate to urban public spaces, especially in highly populated cities. These spatial elements influence access, inclusion and a sense of belonging, and ultimately whether residents feel a sense of ownership of shared spaces. Boundaries - be they physical, social or symbolic - define the edges of urban public spaces, while liminal spaces act as transitional zones where multiple groups and activities meet.Together, they mediate the connections between individuals and the built environment, shaping patterns of usage and social interaction (Tavakoli et al. 2023).

Visible and invisible boundaries define the limits of public and semi-public spaces. Physical barriers such as fences, controlled entry points or security infrastructure can restrict access and fragment public spaces, reducing the sense of ownership among certain groups. In highly densely populated cities, commercial interests or privatisation often lead to the closure of once public spaces, reinforcing social divisions. However, boundaries also serve positive functions: clear spatial definitions can create identity and a sense of security, helping local communities to maintain a connection with particular urban spaces. For example, parks with defined boundaries and locally managed public spaces often strengthen social connections and sense of ownership. Boundary spaces - such as alleys, transport hubs, sidewalks and squares - serve as meeting points where different urban activities and social groups come together. These spaces can either reinforce exclusion or provide opportunities for informal ownership and community building. In densely populated cities, liminal spaces are often sites of informal economies and spontaneous social interactions, allowing different populations to engage with the city on their own terms. However, if liminal spaces become too commercialised or highly regulated, they can lose their inclusiveness, reducing the ability of residents to feel a sense of common ownership (Magnusson, 2005; Mayo, 2011; Tonkiss, 2013).

We can see therefore, that highly dense cities worldwide face a range of challenges, including housing affordability, infrastructure strain, environmental degradation, and socio-economic inequalities as well as the challenges of shared ownership. Addressing this challenge requires policies that put community participation at the forefront of urban planning and public space management. Governments and urban planners need to adopt inclusive design principles which allow flexible and multifunctional spaces, ensuring that different groups can coexist without conflict. Initiatives such as participatory urban planning, community programmes and regulations that limit excessive commercialisation can help to restore a sense of ownership among local residents (Flores, 2013.). By fostering closer links between people and their urban environment, cities can transform public spaces into real community values, rather than areas of competing interests. The design and management of urban borders and boundary areas have a significant impact on whether public spaces remain inclusive or become contested areas. If boundaries are too rigid, they can lead to exclusion and social fragmentation, while spaces that are too flexible may not be stable and support long-term community engagement. Successful public spaces often strike a balance between the two - while maintaining defined boundaries, they also allow for flexible, boundary zones that encourage informal use. Cities that prioritise adaptive urban design, such as pedestrian-friendly streetscapes and permeable public spaces, create environments where diverse users can coexist while fostering a sense of local ownership (Gehl, 2013; Speck, 2018).

3. A case study for sensing ownership

3.1 Background

School fronts, just like liminal spaces, are “at the boundary of two dominant spaces, which is not fully part of either” (Dale and Burrell, 2008: 238), functions of school front areas are not easily defined just like their ownership by a specific group (students, teachers, parents, drivers, locals ect.) and these are the spaces where anything can happen (Turner, 1974 cited by Shortt, 2015). The paper presents the latest methodology of a 3-year research project applying placemaking and participatory design to prepare and co-create the sense of shared ownership of a school-front area in Budapest, with the aim to explore how social design might facilitate children's physical and mental visibility and safety regarding the inclusivity of public places through placemaking.

The interdisciplinary R&D project is developed and led by a Budapest based design university and was conducted in cooperation with the Centre for Budapest Transport, the Institute for People-Environment Transaction of Eötvös Lóránd University and the Municipality of the 7th district of Budapest (Erzsébetváros). Since its beginning, the project involved several schools of the district, focusing on the involvement by different methods for different user groups: the main target group of the participation are (1) students aged 12-13 (by participatory design workshops), followed by (2) their teachers (by interviews and forums), (3) other students of the school community (by interactive posters and questionnaires) (4) their parents (by questionnaires) and (5) the habitats of the close area (by online questionnaires). The first phase of the research project (conducted in 2022-23) was already introduced by the research team, and resulted in a co-design installation, placed on the street in front of the involved school. Based on the results and lessons of the first phase, the research continued by the grant of Erzsébetváros and the involvement of a new school. The paper will introduce the second collaboration and its methods supporting the sense of shared ownership among the involved community.

The second collaboration started in the beginning of 2024, focused on the question: How social design might facilitate children's physical and mental safety and visibility regarding the inclusivity of public places through placemaking? Although the main structure of the previous phase was applied in the second one as well, a bigger emphasis was placed on the involvement of children: while during the first phase four different schools were involved in the research, the second phase involved only one school but with much more engagement. The main steps of the second collaboration started with (1) an initial research, followed by (2) problem mapping and (3) participatory design workshops, (4) validation and (5) finalisation.

3.2 Research process

The initial research used traditional research methods, such as outdoor observation with dense description, interviews with the teachers of the school, and questionnaires for the students and their parents. This part of the research aimed to better understand the mobility and space usage habits of the above mentioned groups, focusing on the school-front area. The initial research explored the general routines of school days, the general physical conditions as well as the rules and habits connected to the school-front area, the children's habits regarding their journeys to and from school, and their favorite and most used spots in the neighborhood.

The problem mapping workshops included five occasions (45 minutes each) for 20 students from 7th grade aiming to move away from the traditional educational setting towards a more collaborative, dialogue based process. To foster this calm environment,

these exercises were playful and encouraged open communication. Since it was key to understand the needs of the young students, to build mutual trust and to share understanding of the research aims as well as to explain their role in the process, the very first session was dedicated to getting to know each other in a playful way, involving mainly movements instead of verbal methods. During the second workshop, the students created a common cognitive map (Altman et al. 1978) about the urban environment of their school. They had to involve not only its physical conditions (with parking sports, green areas, traffic lights and so on) but also they had to place their emotions (fear, happiness, loneliness, togetherness etc.) on this commonly created map to help the researchers to understand the advantages and limitations of the place in its fullness. By cognitive mapping, the research team gained a deeper understanding of how familiar the children are with the neighborhood, what functions they can identify, and what their emotional connection to this environment is (Fig. 1).

Figure 1. Cognitive mapping with the students of Baross Gábor Primary School. Photo by Ádám Gábor Teket. 2024.02.08.

During the third workshop, we asked students to create “personas” with the aim to understand the habits of primary users of the school front area (especially through the experiences of the students). In the first round we ask them to list as many user groups as possible: they listed students, teachers, elderly people, parents, smaller siblings, drivers, locals, dog owners, students from the neighbouring secondary school, bikers and walkers. After creating this list we asked the students to vote and categorise independently the groups into primary and secondary users. After the students developed four personas of

the collectively picked four primary user groups (teachers, parents, drivers and students from the neighbouring secondary school), matched them with both internal and external characteristics (Fig. 2).

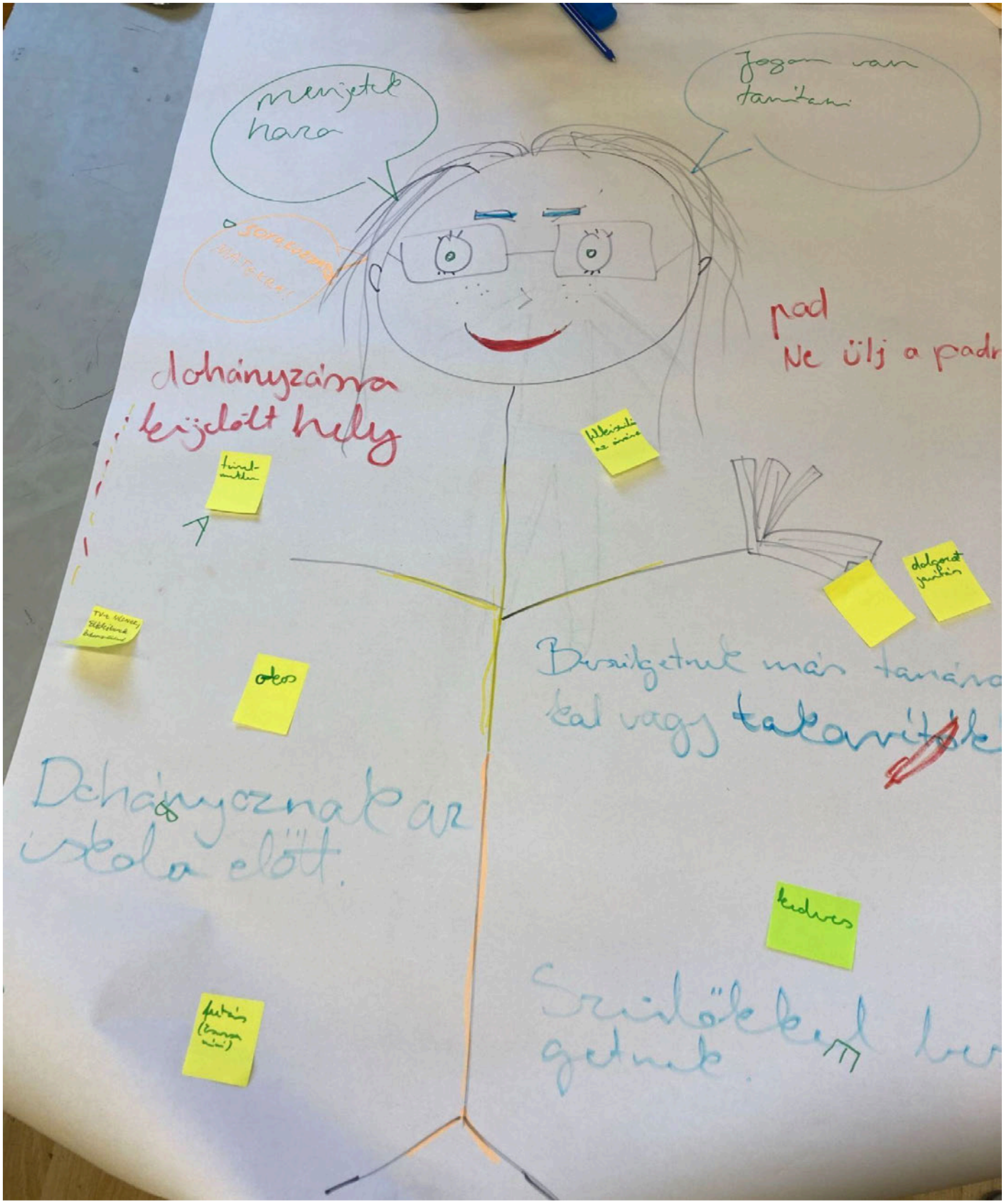

Figure 2. One of the personas created by the students of Baross Gábor Primary School. Photo by Ádám Gábor Teket. 2024.02.14.

As for the fourth session, the focus was on the children's needs. To gain a deeper understanding of what are the characteristics of their desired space and what are the main functional needs, a collaborative collage was created to identify the main functions and envisioned elements. During the last occasion of the problem-mapping phase, the children took a short walk around the neighborhood, critically examining the spaces, their functions and the current conditions, as well as in a playful way we tested together parking spots replaced by imaginary, community functions (Fig. 3).

Figure 3. Testing the parking spots and creating imaginary functions with the students of Baross Gábor Primary School. Photo by Ádám Gábor Teket. 2024.02.28.

After the thorough problem mapping the next phase was the participatory design workshops. As a very first step the researchers introduced for the students eight optional design principles, each based on the analysis of the problem mapping workshops. Students were asked to vote independently on three principles which they believed were the most important ones. Based on the independent votes, the class agreed on three main design principles to follow:

1. This is a place that is inclusive of others as well.
2. This is a place where we can release tension.
3. This is a place that helps us to calm down and feel safe. (Fig. 4)

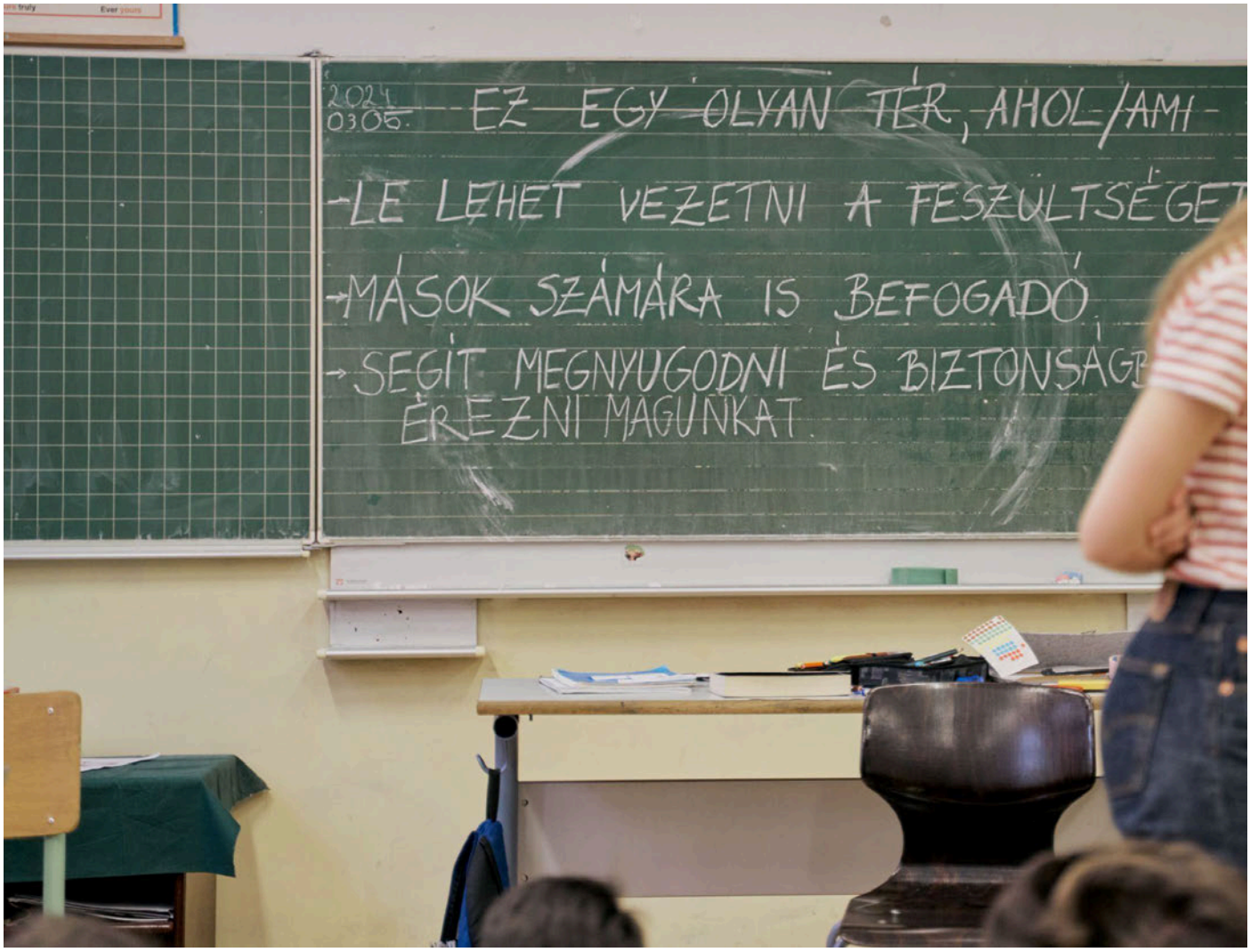

Figure 4. Design principles chosen by the children. Photo by Noémi Szécsi. 2024.03.07.

After deciding on design principles, students gathered into smaller groups, picked among previously collected functional needs (such as sitting, chatting, eating, relaxing, playing ect.) and started to brainstorm about and model small-scale interventions into the school front area (Fig.5).

Figure 5. Co-design workshop with the students of Baross Gábor Primary School. Photo by Noémi Szécsi. 2024.03.07.

Based on the inputs and results of the problem mapping and participatory design workshops, two different concepts were prepared by an external architect: one version occupied two parking spots and involved lively colours and few sitting surfaces, while the other occupied four parking spots with less vibrant colours and more sitting (and thus waiting) opportunities.

During the validation phase, the two concepts were introduced for the school community in different forms. First of all, the involved class participated in a validating workshop, allowing them to contribute with additional ideas and critiques to the proposed designs (Fig. 6).

Figure 6. Validation workshop at Baross Gábor Primary School. Photo by Noémi Szécsi. 2024.04.08.

For the other students of the school a large validation poster was created and placed on the corridor of the school for one week, offering an indirect way to give feedback. The poster introduced the concepts and asked for opinions in different playful ways (Fig. 7).

Figure 7. Detail of the interactive poster placed at the school. Photo by Gábor Ádám Teket. 2024.04.15.

Regarding the teachers, the research team introduced the project findings and the two

concepts through an interactive presentation. The occasion turned out to be a fruitful discussion, and raised valid questions about the responsibility for students spending time in the soon-to-be-formed space after school. Based on the feedback, the final design concept has been developed and handed over to the representatives of Erzsébetváros in order to prepare the installation, which should start in spring 2025. Until the beginning of 2025, the municipality collected feedback from residents through an online questionnaire to understand if locals are satisfied with the design concept and to find out their concerns as well.

4. Results

During the research, we collected qualitative data through observations, questionnaires, interviews as well as problem mapping and participatory design workshops aiming to understand if social design can facilitate the development of sensing shared ownership. The examinations and the co-creational workshops resulted in a deeper understanding of the challenges children face in the specific urban environment of school front areas. We have learnt (just like in our previous research phase) that the involved students face a high level of placelessness: there is no dedicated place for them to gather and socialise after school or to wait for each other. And even more, they feel unwanted in this environment (based on the personas of drivers, teachers and neighbour students) resulting in them being unable to develop an ownership of this place.

Based on both the process and the outcomes, we could recognise the benefits of participatory design methods resulting in intangible outcomes. According to the observations as well as the feedback of the children, the sense of shared ownership developed among the students: during several activities aiming to collect all the stakeholders of the school front area, students listed themself among the first user groups while also recognised other users, furthermore even stakeholders whom they cannot see in the neighborhood, like the local municipality. There were several activities which supported the development of shared ownership: (1) by the collaborative work and honest communication they felt their real role as stakeholders, (2) by persona building they could emphasise other users' point of views and (3) by taking part in the design process they could understand the limitations of "adult world". A good illustration for this last aspect was the validation workshop, where they accepted the decision that we cannot implement a trampoline into the middle of the road, but instead we could keep the metaphor of their desired "magic gate" which takes away all their struggles.

(1) The collaborative work and honest communication was the foundation of making the students real stakeholders in the process. By emphasizing the fact that their ideas will be recognised in the final designs made them enthusiastic about the workshops and they felt that they are not only heard, but their thoughts are valuable for the project. It was a new perspective for them, that they can be involved in an ideation as agents of change. They had no previous knowledge that it is possible to actively engage in designing their own built environment and not only passively use it. As a result the design process became a transparent action laying down a groundwork for an inclusive and yet playful and enjoyable process. Making the children feel important opened them up, and this way we managed to collect many useful thoughts and ideas through their empowerment

(2) The persona building exercise highlighted the fact that the children are aware of the many other users of the space. They could easily step into the shoes of others, including the teachers, passers-by, drivers and locals. The task was enabling them to empathise with the other stakeholders, think through their needs and desires regarding that area, and to walk through the complex challenges they face on a day to day basis. The task was a also a good tool for not only examine them individually, but to learn more about

their complex relations. This step resulted as a key step in the process, because the children started their ideation from a more holistic point of view, being more considerate to the others' needs. The task made them realise that although they are frequent users of the space, there is a diverse community who also have certain necessities regarding that area. It served as an important pillar before the design process, so that their ideas come from a more inclusive place, with a better understanding of shared ownership.

(3) By involving the children in the design process it was important to show them it's real circumstances and make it possible for them to have a glance in the so called "adult world", where the decisions are largely affected by regulations. Throughout the process they were encouraged to think freely and share their unfiltered thoughts, so that their original ideas and true motivations could be integrated in the design, but at the same time they received constant feedback on feasibility. It was essential to explain to them, that every decision in the design is going through a reality check, meaning the policy regulations, budget limitations, safety regulations or spatial limitations. In order to not to break down their enthusiasm, the process took time to explain where were their ideas used or how they were translated into the design. There is a good example that illustrates this challenge: the students really wanted to have a trampoline in front of the school, but due to many regulations it was not possible to realise, however their need for playfulness was an important aspect for the final design. The 'magic gate' - which is an element designed by the children to make their homework disappear - is also something that represents, how children feel the liminality of the school front and was kept as a reminder to create a design, which offers a space for transformation and relief. These steps introduced the reality of urban planning to the children in a transparent way, and the negotiations developed their sense of agency and imagination through an empowering process.

We could also understand that it is not simply the participation in the design process that brings the sense of ownership but the message it delivers. It had prior importance to find a relevant environment and a shared motivation: we decided to focus on a special and yet undervalued urban environment which is used by the children on an everyday basis but misses to serve its main functions: to navigate students physically and mentally between the inside and outside. Finding and discussing these important needs, children found their role and by that motivation to engage in a shared cause. Also participatory design process gave enough opportunity to be honest and give agency: since we treated students as partners, they acted like one: they gave us space to explain the physical and regulatory limitations of the environment and the reasons why we cannot install some desired elements in the middle of the street. Also there were several occasions when we handed over the decision making to the students in different forms (through voting, feedback and a big-scale interactive validation poster for the whole school community where even the more silent students got the chance to leave us their comments and criticisms). Since the children also articulated their new ideas according to the size and setup of the installation, it means that the participatory process successfully involved the students in the design process: they started to feel engagement, ownership and control.

5. Conclusions

According to the outcomes, we could also identify several limitations and obstacles connected to the aim of the project, highlighting systemic issues such as the general placelessness of the students and the challenges of bringing together diverse needs of place users. The project had no chance and capacity to be involved in the discussion with local residents: acknowledging the strong need for parking spots in the densely built neighbourhood, the offered concept (using 2-4 parking spots) might get into conflict with

the general need of local car owners. Even the researchers introduced the design concept and its background for the local representatives and by that, they could reach a common understanding about the benefits of the planned implementation, still the municipality reaches out to the locals only through online questionnaires instead of an offline forum, community design workshop or any kind of active participational form. Also we had to understand that by a paper formed questionnaire we cannot reach out effectively towards parents. Moving forward, the research aims to integrate involving additional stakeholders more directly and focusing on more diverse groups of users besides children.

Based on these limitations we can also see that for future research directions it would be beneficial to develop and test a same detailed methodology for other place users as well as to bring these different groups of users together aiming to find their shared motivations and needs. Connected to this it would be also fruitful to involve university students from the design and theory field to not only develop methodology and proper space development but also to raise awareness on the possibilities of participatory approaches amond the next designer generations.

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The Counter Cartography: A Graphic Representation of the Transparent Urban Layer

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ABSTRACT | The concept of 'smart cities' has been around for years, yet in some cases its influence is questionable at best, focusing mainly on lighting solutions, garbage disposal or parking issues. As in other vistas of urban design, the socio-cultural aspects of urban communities and their changing needs have been left out of the contemporary debate. This is in part due to the tendency of the smart city paradigm, to focus primarily on territorial development strategies aimed at increasing efficiency and improving living conditions as well as urban management. Due to the model's reliance on data-driven technological mapping, gaps in knowledge are created which may lead to insufficient or irrelevant interpretation and neglect of the complexity of urban dynamics. As Foucault and his successors in critical theory remarked, no data is objective, and therefore we need to archaeologically decipher its power relations. When focusing on urban social design, the process needs to start with representing the daily reality of the lives of marginalised communities in the urban environment. Following these micro-narratives will ensure a broader rethinking of the social, political and economic inequality faced by residents who are not included in the data.

As we know, cartography or mapping design is political at its core, based on power relations, techniques of control and rearrangement of the urban sphere. The challenge of urban mapping, then, calls for counter-cartography. I.e., a redesign of mapping tools that will help us redesign a better understanding of the urban environment. We offer to redefine urban mapping by using graphic design practices as a discipline rooted in symbolism and semantics, with a deeper understanding of socio-cultural sensitivities and differences. Counter-cartography is an approach that creates alternative maps that expose

marginalised issues by challenging dominant cartographic narratives. Actions are taken to reveal invisible or missing realities by satisfying additional platforms or opposing hegemonic cartography. Through counter-cartography, diverse voices and experiences can be brought together to create maps that reflect urban life's diverse realities. The purpose of this approach is to challenge the normative narratives perpetuated by traditional mapping practices and to provide a more nuanced understanding of spatial dynamics.

By combining graphic design with counter cartography, smart city initiatives can be transformed from mere data collection into powerful narratives that could help in the creation of more equal and inclusive futures. Through the use of symbols and visual storytelling, maps can convey multifaceted social meanings that resonate deeply with local communities. By using visual elements that are clear to a wider range of users, links can be developed to the data represented. The use of counter-cartography encourages residents to engage with and interpret data by emphasising culturally relevant symbols and accessible design, enabling them to actively participate in discussions regarding their urban environment.

KEYWORDS | social design, design justice, social cartography, counter-cartography, geo-design

1. Introduction

> *To claim the right to the city in the sense I mean it here is to claim some kind of shaping power over the processes of urbanization, over the ways in which our cities are made and remade, and to do so in a fundamental and radical way. From their very inception, cities have arisen through the geographical and social concentration of a surplus product. Urbanization has always been, therefore, a class phenomenon of some sort, since surpluses have been extracted from somewhere and from somebody, while control over the use of the surplus typically lies in the hands of a few* (Harvey, 2012: 5).

> *A common feature of almost all cities — regardless of global location, economic viability and stage of development — is that the people who still use city space in great numbers have been increasingly poorly treated* (Gehl, 2010: 3).

> *Revolutionary events generally take place in the street. Doesn't this show that the disorder of the street engenders another kind of order? The urban space of the street is a place for talk, given over as much to the exchange of words and signs as it is to the exchange of things. A place where speech becomes writing. A place where speech can become "savage" and, by escaping rules and institutions, inscribe itself on walls* (Lefebvre, 2003: 19).

As these quotes illustrate, the city square has long been a focal point for the struggle over the right to the city. It serves as a space where marginalized groups can make their voices heard, share ideas, and challenge the dominant power structures that shape urban life. However, as Lefebvre notes, the process of translating this revolutionary potential into meaningful social and political change is often long and arduous.

One key factor in this struggle is the structural power of the urban landscape itself. As Foucault's work on knowledge and discourse highlights, the control of information and the strategic distribution of populations within the city have been crucial tools for maintaining the status quo. Statistical data on the movements and characteristics of urban residents can be used to monitor, regulate, and discipline marginalized communities.

In response to these dynamics, critical cartography has emerged as an important tool for resisting dominant power structures and advocating for a more just and inclusive right to the city.

By creating alternative maps that foreground the experiences and perspectives of excluded and marginalized groups, critical cartographers seek to challenge the dominant representations of urban space and make visible the hidden layers of power and inequality that shape city life.

This work takes on heightened urgency in our current digital age, where the proliferation of data and virtual representations of the city can further entrench existing power imbalances. In a post-truth era, the ability to control and shape the narrative around urban space becomes increasingly critical. By mapping the lived realities of marginalized communities and making their experiences visible within the digital landscape, critical cartography offers a powerful means of influencing the discourse around the right to the city and advocating for more just and equitable urban futures.

In this context, "The Counter Cartography" makes a vital contribution to the field of critical urban studies. By presenting innovative mapping methodologies that foreground the voices and experiences of undocumented West African migrants in Tel Aviv, the article demonstrates the potential of critical cartography to challenge dominant representations of the city and create a more inclusive and empowering vision of urban life. Through the strategic use of graphic design and visual symbology, the maps featured in the article create a universally legible lexicon that allows marginalized communities to represent their own experiences and challenge dominant narratives about the city.

In doing so, the article highlights the crucial role that critical cartography can play in the ongoing struggle for a more just and equitable right to the city. By making visible the invisible layers of power and exclusion that shape urban life, and by providing marginalised communities with the tools to represent their own experiences, counter-cartography emerges as a powerful form of activism and a catalyst for social change. As such, "The Counter Cartography" opens up new avenues for research and praxis at the intersection of urban studies, cartography, and social justice, paving the way for more inclusive and empowering visions of the city in the digital age.

2. From Visual Culture to Critical Social Cartography

In our current reality, the importance and the deeply rooted link between data, citizenship and their graphic representation couldn’t be more present. From the navigation, and route suggested to us through designated apps, through the maps we relate to our present in the urban space, to the ways monetary and judicial privileges and fines are organised - we all pass through visual-digital screens. This research examines how graphic design, as a discipline rooted in symbolism and semantics, can transform urban cartographic practices. We argue that the semiotic foundation of graphic design offers unique possibilities for representing marginalised urban narratives that are often overlooked in traditional and somewhat conservative smart city approaches which tend to focus on specific applications of the urban landscape. The theoretical framework we develop here combines critical design practices with counter-cartographic methodologies to create more inclusive forms of urban representation.

Indeed, due to the limited nature of this publication, we do not wish to delve into the history of visual representation or the various theories of semiotics, symbolisms and visual metaphors. We base our assumptions on our ever-growing dependency on the visual to understand our reality, communicate with others and navigate between the virtual and material realities around us (Topelberg and Ventura, 2024). In a complex reality where the line between truth and falsehood and between professional and amateur production of visual representations, we need a critical understanding of our surroundings.

Drawing on semiotics and visual culture theory, graphic design creates what Kostelnick and Hassett (2003) term "visual rhetoric", i.e., systems of representation that communicate complex social meanings through carefully constructed visual elements. As such, the exclusion of women from street signs attests to the ideological control over social norms and conventions. In our research, we build on this understanding to examine how visual elements can serve as tools for social justice in urban mapping. The semiotic approach operates on multiple levels: at the denotative level, symbols directly represent physical or spatial information, while at the connotative level, these elements carry deeper cultural and political meanings that can challenge existing power structures.

While visual culture theoreticians deal with the issues of power and representation, the

equivalent in cartography has yet to make a similar leap. Indeed, this has been linked to urban design through social initiatives such as public participation or place-making but has not yet influenced the various practices of urban cartography. Current smart city paradigms, while technologically advanced, often fail to capture crucial socio-cultural aspects of urban communities. As Berg et al. (2016) and Piazzoni (2023) demonstrate, data-driven systems excel at managing infrastructure but struggle to represent less quantifiable aspects of urban life. This limitation becomes particularly apparent when examining what we identify as parallel urban realities: the visible city, managed through formal data collection, and the invisible city, comprising marginalised communities and unofficial or “transparent” activities (Liodaki et al., 2024; MacLeavy et al., 2012). This tendency to ‘clean’ the digital urban facade, offering a neat representation of digital movements and spheres of residents is but another facade used to camouflage and bolster power relations and control in the urban landscape. In other words, these are new systems to keep maintaining the same attitude towards the right to the city, or lack of it.

While local communities and local representation have been discussed at length in both urban design and visual culture respectfully, we believe the deeper practices of community management lie in cartography. This falls well within the classic post-Marxist approach to power relations, as this layer of data management remains hidden from most, under a nice sheen of the new and newer digital platforms of movement and management in the urban landscape. Therefore, we turn to critical cartography which provides important theoretical foundations for addressing these limitations. Following Crampton & Krygier (2006), we approach maps not as neutral documents, but as rich visual texts embedded with power relations and cultural assumptions. Building on this, our research develops what Pavlovskaya (2018) terms "participatory mapping" - practices that actively involve communities in representing their spatial experiences. As previously mentioned, we want to offer an innovative approach to urban representation composed of two major theoretical spheres of knowledge - critical cartography and social design.

Critical cartography, emerging from the broader critical turn in the social sciences, fundamentally challenges the presumed objectivity of maps. While cartography traditionally combines technical expertise from the exact sciences with visual representation principles, its seeming objectivity is shaped by political, social, and cultural viewpoints embedded in visual choices (Edoardo Boria, 2020; Farinelli, 1992; Pickles, 2004). This inherent subjectivity has led to profound criticism, particularly regarding cartography's role in producing and protecting colonial, imperialist, and patriarchal geographies (Akerman, 2017; Cohen & Duggan, 2021).

The critical cartographic approach shifts its focus from maps’ neutrality to their functioning as an ideological tool, emphasizing that mapping is inherently a political process shaped by social context, purpose, and influence (Liodaki et al., 2024). Maps, as scientific, cultural, and political artifacts, require critical examination through ontological questions about the existence or non-existence of territorial entities, aiming to highlight spatial conflicts and power relations (Elwood, 2006; Kwan, 2004; Sheppard, 2005).

One significant development within critical cartography is autonomous cartography, which produces auto-spatial mapping as a tool for understanding how hybrid spaces evolve into spatial systems connected by a non-geographic fabric, including the virtual and digital realms (Pickerill & Chatterton, 2006). This approach operates on principles such as reciprocity, voluntary assistance, and self-organization, positioned between individual liberty and collective organization. These systems are based on relationships across various spaces beyond the purely geographical, including virtual communities and digital networks (Pickerill, 2007).

This evolution echoes the development of place-making practices, where both approaches emphasise bottom-up processes and the importance of local knowledge validation. Contemporary critical cartography has expanded to address modern urban challenges, particularly within smart cities and digital mapping technologies. Scholars like Crampton, 2011 and Pavlovskaya, 2018 examine how digital cartographic practices can either perpetuate or challenge existing power relations, leading to what we might term 'digital critical cartography' - a particularly relevant approach when examining how smart city technologies, while promising efficiency, often reinforce existing social hierarchies through their mapping practices.

The development of visual language for counter-cartography involves constructing entire meaning systems that can represent complex social realities. Through our work with typography, colour theory, and visual hierarchy, we explore what (Tufte, 1987) describes as "layers of reading" - where different levels of information become accessible to different audiences while

maintaining spatial data integrity. Traditional cartographic symbols often fail to capture the dynamic nature of unofficial urban activities, leading to what Wood (2010) terms "cartographic silences." Our research responds to these limitations by developing alternative mapping practices that, as Peluso (1995a) argues, can serve as tools for social justice and community empowerment.

Fricker (2007) identifies two forms of what she terms 'epistemic injustice'. The first is "testimonial injustice" and it "occurs when prejudice causes a hearer to give a deflated level of credibility to a speaker's word" (Fricker, 2007: 1). The second type is "hermeneutical injustice", which "occurs at a prior stage when a gap in collective interpretive resources puts someone at an unfair disadvantage when it comes to making sense of their social experiences" (Fricker, 2007: 1). While historically, designers did not deal with justice, in the last few decades they tend to deal with the first, although the second runs deeper with more practical implications to individuals and communities (Guersenzweig et al., 2025). This notion of professionals - graphic or urban designers and planners - needing to take responsibility and change the status of communities in the city runs hand in hand with the essence of the 'right to the city' (Lefebvre, 2003; Harvey, 2012).

Contemporary smart city paradigms, despite their technological advancements, frequently overlook critical socio-cultural dimensions of urban existence. Research suggests that data-driven systems excel in infrastructure management yet struggle to encapsulate the lived realities of marginalised communities (Berg et al., 2016; Piazzoni, 2023). This deficiency underscores the necessity of addressing the dichotomy between the visible city—managed through formal data collection—and the invisible city, encompassing unofficial activities and communities existing beyond formal recognition (Liodaki et al., 2024; MacLeavy et al., 2012).

Critical cartography provides a foundational theory for this analysis, directing attention to maps as cultural artifacts embedded with power relations (Crampton & Krygier, 2018). This study develops participatory mapping practices that engage communities in articulating their spatial experiences (Pavlovskaya, 2018). Constructing visual languages for counter-cartography effectively endeavours to articulate complex social realities while responding to the "cartographic silences" identified by Wood (2010). Moreover, in alignment with Foucauldian frameworks of power-knowledge relations, this research recognises that design choices in cartography actively shape spatial realities rather than merely depicting them (Dalton & Stallmann, 2018). This insight culminates in the adoption of "thick mapping," facilitating a connection between quantitative data and qualitative lived experiences (Presner et al., 2014). The overarching objective is to forge innovative cartographic languages capable of representing urban complexities without compromising the dignity or safety of marginalised communities.

Following Foucault's framework of power-knowledge relations, we recognise that design choices in cartographic representation actively produce spatial realities rather than merely representing them (Dalton & Stallmann, 2018). In other words, designers, for various reasons, historically focused on reproducing these power relations instead of offering alternatives (Guersenzvaig, 2021). This understanding leads us to develop what Presner et al. (2014) call "thick mapping," where visual design serves as a bridge between quantitative data and lived experience. This approach extends beyond traditional cartographic methods by incorporating multiple layers of meaning - from statistical data to personal narratives, from official urban planning to informal spatial practices. Through careful consideration of visual systems and symbolic representation, our work aims to create new cartographic languages that can represent urban complexity without compromising the safety or dignity of marginalised communities and urban phenomena. These new visual languages operate on multiple levels: they document both formal and informal spatial practices while simultaneously challenging dominant power structures; they validate unofficial uses of space and overlooked urban phenomena, whether intentionally or unintentionally excluded; and they create platforms for alternative narratives and hidden urban dynamics to emerge and be understood. By integrating critical cartography with social design principles, we establish a methodology that is both analytically rigorous and socially transformative. The common denominator is twofold - a value-oriented and ideological approach to represent the unrepresented and excluded (both communities and urban phenomena) and a sociocultural approach that recognises the complexity of urban space not just through its official manifestations, but through its full spectrum of uses, practices, and dynamics that shape our immediate urban landscape.

The difference between mapping recognized communities and undocumented migrant workers reveals not a quantitative difference but a fundamental incomparability. Official city

residents are represented in countless databases: property tax records, education and health systems, tax payments, employment records, and movement through space. This excess representation creates a situation where there is effectively almost no knowledge gap about them—they are already "over-included" in urban control systems.

In contrast, undocumented West African migrant workers are entirely absent from these systems. They have no registration in public systems, no bank accounts (as one participant noted: "unlike the Eritreans, we don't have bank accounts, all our money is on us"), and they do not appear in official housing records. Thus, they are de facto excluded from the 'right to the city'. Knowledge about them can only be gathered through them directly or through their informal work pathways.

This incomparability fundamentally changes the meaning of mapping. For registered residents, participatory mapping is a means to influence existing representation. For undocumented communities, it is a primary act of visibility that carries risks of exposure and enforcement. The "ghetto by choice" described by participants illustrates this—a space imposed on them through exclusion, but also one the community appropriates as a safety zone against control mechanisms.

Counter-cartography is therefore not merely a participatory mapping practice but a political strategy developing a visual language that preserves deliberate ambiguity and cartographic autonomy. It expresses the inherent tension between the need for visibility and the need for anonymity, emphasizing that the question is not just "how to map?" but "whether to map at all?" and "in whose service does mapping stand?"

3. The Case of West African migrant workers in Tel Aviv

Tel Aviv's urban landscape exemplifies a complex interplay of intersecting realities that rarely engage with one another. While the city promotes itself as a global, liberal and progressive "smart city," focused on technological innovation and urban efficiency, it concurrently accommodates communities that actively resist documentation and visibility. Among these, undocumented West African migrants present a nuanced case of urban navigation and spatial practice characterised by their unrecognised status. This is a socio-cultural agenda highlighted by the ever-growing real-estate prices, heralding a ‘rich-only’ urban environment excluding all social communities that are deemed unwanted and irrelevant to this economic sphere. This is added to an already problematic cultural view of ‘us-against-them’ becoming even more acute following the unending Israel-Hamas War that started in October 2023. This is added to the heavy hand of local police targeting non-Jewish citizens as a clearly cut agenda developed by the extreme right current government.

In contrast to migrants from Eritrea and Sudan, who benefit from collective protection status within Israel, West African migrants traverse the urban environment without acknowledgement or documentation, leading to unique patterns of movement and spatial knowledge that evade conventional urban mapping techniques. While they wish to remain invisible for obvious reasons, the local government shifted between an external ignorance approach and the Faucauldian need for controlling daily realities, resulting in a mixture of neglect and harassment. This experience challenges established cartographic conventions and incites critical inquiries regarding how communities seeking to remain unrecorded can assert their presence and articulate their needs within urban discourse.

Our methodological framework combines two distinct yet complementary approaches: critical design practices and counter-cartographic methodologies. Critical design methodologies challenge conventional design thinking by questioning established power structures and promoting social change through design interventions. Following Harley's (1989) deconstructivist approach, we treat maps not as objective representations but as texts that require reading 'between the lines' to expose distortions and contradictions that challenge their apparent accuracy. This approach aligns with post-structuralist influences, which argue that reality can only be fully understood through a comprehensive and unified view of the whole (Caquard & Cartwright, 2014).

Geo-design offers a dynamic methodological paradigm that transcends traditional overlay mapping. Following Steinitz's framework, it provides a practical approach rooted in iterative models and interdisciplinary collaboration. Unlike Simon's classic approach to design as problem-solving, currently shifting towards artificial intelligence and data collection, Steinitz emphasises

stakeholder engagement and bottom-up knowledge production (Steinitz, 2012). The socially oriented graphic design approach we employ provides a crucial advantage over traditional cartographic methods through its established expertise in creating clear, universally understood visual systems that aren't necessarily derived from mapping conventions. This expertise in developing inclusive visual languages allows us to create new symbolic systems that can represent urban phenomena and community experiences without being constrained by traditional cartographic conventions.

These methodological approaches are particularly relevant when examining West African migrants in Tel Aviv, a community that emerged within broader geopolitical and socio-economic shifts since the 1990s. While exact numbers are challenging to verify due to their undocumented status, community organisations estimate between 2,000-3,000 West-African migrants currently residing in Tel Aviv, primarily concentrated in the city's southern neighbourhoods (Cohen, 2021). These communities have become integral to Tel Aviv's 'secondary labour market' (Kemp, 2003), primarily in cleaning services, low-echelon roles in restaurants, delivery services, construction, and day labour (locally termed 'chik-chak' work).

Our research methodology stemmed primarily from the collaboration with Taore, a key community member from the Ivory Coast, who agreed to be identified and guide the research process. This research facilitator provided French translation and served as a cultural mediator, establishing trust and creating connections between us and other community members. Through this trusted intermediary, we engaged with a broader network of participants over eighteen months (2023-2024). Our methodology included:

- In-depth interviews with 25 community members, facilitated and translated when necessary
- participatory mapping workshops using Tel Aviv city maps as a basis for semi-structured interviews, incorporating participants' auto-ethnographic mapping
- Visual documentation of spatial practices, guided by participants' comfort levels and safety concerns

The presence of a community member as a research facilitator enabled us to build trust while maintaining rigorous ethical standards, bridging both linguistic and cultural gaps in our research process.

4. Phase One: Community-Based Visual Literacy

This initial phase centres on cultivating 'community visual literacy' - a concept that encompasses both the ability to read and interpret spatial representations and the capacity to create meaningful visual narratives of lived experiences. As Baylen and Lucas (2014) demonstrate in their comprehensive review of visual literacy research, this ability goes beyond basic interpretation to include active creation and critical engagement with visual representations. Mitchell (2002) further emphasises that visual literacy involves not just seeing but understanding and critically evaluating visual messages within specific social contexts. To implement this approach, we developed a participatory mapping methodology that transformed official cartographic representations into tools for community expression. The process began with printed municipal maps of Tel Aviv, which we specifically selected from the city's non-commercial English-language cartographic materials, ensuring neutrality and accessibility. These maps, complete with street names and city boundaries, served as a foundational canvas for participants to document their urban experiences. Through a structured yet flexible framework, participants were asked to respond to five fundamental questions:

1. Where do you live?
2. Where do you work?
3. How do you travel from home to work?
4. What areas do you enjoy exploring in the city after work hours?
5. What areas make you feel unsafe, and where would you avoid spending time?

As mentioned, Traore, a key informant who is himself an undocumented migrant worker from Côte d'Ivoire, living in Tel-Aviv for 15 years and married to an Israeli citizen, helped us in our empirical research. Participants, working with Traore, marked their responses using a coded identification system that revealed their country of origin, age, and primary occupation in the city.

As Harper (2002) notes, such collaborative approaches allow marginalised groups to develop distinct ways of seeing and representing their social realities that challenge dominant visual narratives.

The methodological framework combined visual ethnography with critical mapping techniques, enabling what Dennis (2006) describes as a process where communities learn to both interpret official spatial representations and create alternative visualisations that better reflect their lived experiences. Through ethnographic mapping, we sought to understand how individuals and communities communicate, navigate, and relate to their urban surroundings, including spatial organisation of territory and practices of surveillance (Kuznar and Werner, 2001). The method proved particularly effective in understanding chosen locations, preferred sites, routes, navigation patterns, and areas of avoidance within the socio-cultural urban landscape (Oliver-Velez et al., 2002; Parkin et al., 2021).

Our approach effectively transformed the municipal map platform from a potential surveillance tool into a collaborative platform for spatial storytelling, where participants could negotiate their visibility and invisibility within the urban landscape. The printed municipal maps served as a foundational canvas, allowing participants to engage with a familiar geographic representation while simultaneously creating layers of intentional ambiguity. This practice aligns with Lefebvre's (1968) concept of 'the right to the city', particularly his emphasis on the right to participation and appropriation of urban space. Through these layered representations, participants exercise what Lefebvre terms 'spatial practice' - how people generate, use, and perceive space. Their selective revealing and concealing of information represent not just a protective measure, but an act of spatial appropriation and agentic ability (Gell, 2003), transforming the official representation of space into what Lefebvre calls 'lived space' (*l'espace vécu*) - the space where inhabitants seek to change and appropriate the pre-existing spatial order.

This methodological approach underscores the significance of strategic opacity in spatial mapping. Participants could mark their movements, work locations, and comfort zones while maintaining a level of protection through their selective and nuanced annotations. The exercise highlighted the need for visual tools that can transcend language barriers and protect individual anonymity, transforming the official city map into a dialogic platform for marginalised voices. Furthermore, this method helped us highlight the gaps and links between the planned or designed space and the lived space relating to a designated community. The coded annotations—revealing only nationality, age, and occupation—created a subtle yet powerful method of participation that balanced the participants' desire for visibility with their need for safety in the urban landscape.

Figure 1. An example of participant mapping

The annotated map (fig. 1) shows how participants marked areas rather than specific geographical points, creating intentionally ambiguous spatial narratives. This particular participant's markings reveal how urban space is conceptualised in terms of general territories rather than precise locations. By indicating broad areas instead of specific points, the mapping technique completely nullifies surveillance possibilities while maintaining a rich discussion of urban space usage. This method not only ensures participant protection through strategic ambiguity but also reveals how undocumented migrants experience and conceptualise urban space as interconnected territories rather than discrete locations. Through this practice, participants developed a new symbolic language for auto-ethnographic urban mapping, creating alternative ways of representing and understanding city spaces.

5. Phase Two: Development of Collective Visual Representation

Building upon the individual mapping process of Phase One, the second phase focused on transforming personal spatial narratives into collective visual representations. Working with the same group of 25 participants, we developed a methodological process that would preserve the richness of individual experiences while creating a comprehensive community-based spatial understanding. The process began with a careful analysis of the intuitive marking patterns that emerged from Phase One's maps. We observed consistent symbolic patterns in how participants naturally chose to represent their spatial experiences: X marks for uncomfortable spaces, check marks (✓) for comfortable areas, circles for living spaces that indicated zones rather than specific addresses, and lines for movement patterns. These organic marking choices formed the foundation of our graphic design decisions. Using Adobe Illustrator, we translated these intuitive community-generated symbols into a standardised visual system that preserved the participants' original spatial language while creating a cohesive collective representation. This transformation of intuitive markings into a formal visual system embodies social design's core principle: empowerment through participatory practice. Rather than imposing visual conventions, the process creates new interpretative resources emerging directly from community knowledge, addressing Fricker's (2007) concept of hermeneutical injustice through design.

The abstraction process aligns with critical cartography's emphasis on challenging dominant mapping conventions. By stripping away traditional geographic markers and replacing them with community-generated symbols, we created what Wood (2010) terms 'counter-maps' - representations that challenge official spatial narratives. The use of clear graphic symbols in counter-cartography is particularly significant as it serves to make visible alternative spatial claims and narratives. While traditional cartography often employs complex symbology that can obscure or intimidate non-expert readers, counter-cartography deliberately uses accessible visual language to democratise spatial representation.

The graphic maps created a safe space for participants to discuss their spatial experiences freely. As one participant noted, 'you are close to your roots here,' while another emphasised how 'we all look and feel alike in this place.' The abstracted visual representation encouraged participants to move beyond geographic specifics to broader discussions of community and belonging. This was evident in comments such as 'living in the community is easier because of the large cultural differences' and 'the community and the group you live with helps you if you need money.'

The mapping process revealed a clear cognitive division between *'their* Tel Aviv' and *'our* Tel Aviv'. This spatial dichotomy was powerfully illustrated when participants discussed areas of comfort versus areas of discomfort, noting that 'unlike the Eritreans, we don't have bank accounts, all the money is on us,' which reinforces the need 'to be around people you know and receive protection' from your community. The intentional ambiguity of our mapping system allowed participants to articulate these sensitive aspects of their urban experience, such as the observation that 'rental payments here are by person, not by apartment,' without compromising their safety.

When discussing areas marked on the maps, participants frequently connected spatial practices to community support networks. This was particularly evident in their description of residential choices, with one participant explaining that 'you can find everything you need from home here.' The graphic representation also facilitated discussions about institutional relationships, with participants noting that while they 'pay taxes to the municipality without requesting services,' their primary concern was about broader issues of recognition and rights.

A particularly significant insight emerged through the graphic maps when participants referred to their residential areas as a 'ghetto by choice' - a term that appeared repeatedly in interviews. As one participant explained, 'The state controls the ghetto it created,' reflecting a complex understanding of how institutional power shapes urban spaces. This framing reveals how communities transform imposed spatial limitations into chosen zones of safety and solidarity. Notably, while participants were hesitant to engage deeply with the printed municipal maps, viewing them as representations of official authority, they responded much more openly to our graphic representations. The abstract visual language allowed them to move beyond the city's official narrative and articulate their own spatial experiences and community dynamics.

While the municipal maps represented *'their* Tel Aviv' - a space of institutional power and surveillance - our graphic maps enabled discussions of *'our* Tel Aviv' - a space of community networks and survival strategies.

These collective maps were deliberately stripped of street names and traditional geographic markers, presenting instead a clean, minimal representation of Tel Aviv's urban grid. The visual layout emphasised the transformation from geographic precision to symbolic representation. This design choice was crucial in shifting the focus from specific locations to broader patterns of spatial use and perception. Through this process, we created a visual language that serves both as a research tool and a form of community empowerment, enabling critical discussion of urban space without compromising participant safety. The graphic symbols, directly informed by participants' marking choices in earlier exercises, maintain a simple, intuitive visual language. Map A highlights areas identified as comfortable, while Map B shows zones perceived as uncomfortable.

Figure 2. presents the aggregation of data from the individual cognitive maps created by participants onto a single, text-free map that we designed in Adobe Illustrator. This visual synthesis, performed by our research team, aimed to clearly present the collective spatial knowledge of the West African migrant community back to them.

6. Phase Three: Integrating Community-Generated Spatial Knowledge into GIS

In the third phase of our research methodology, we focused on the technical process of integrating the community-generated spatial knowledge, as captured in the hand-drawn cognitive maps from Phase One, into the formally structured layers of Geographic Information Systems (GIS). This phase aimed to explore the feasibility and implications of incorporating alternative spatial narratives into the dominant urban mapping technologies, as a means of operationalising the principles of counter-cartography. This phase aimed to explore the feasibility and implications of incorporating alternative spatial narratives into the dominant urban mapping

technologies, as a means of operationalising the principles of counter-cartography. In this process, we set out key objectives:

1. Demonstrating the technical possibility of translating symbolic, intentionally ambiguous cognitive maps into the specified, data-driven language of GIS.
2. Investigating how integrating marginalised communities' spatial knowledge into GIS might challenge the power dynamics embedded in these systems and offer a more inclusive, bottom-up approach to urban mapping.
3. Contributing a concrete methodological example to the theoretical discourse on counter-cartography, illustrating how it can be applied within smart city technologies and urban planning practices.

Following these assertions, we developed and followed several key methodological steps. First, digitisation, whereas the hand-drawn cognitive maps were carefully digitised using ArcGIS software, with special attention given to preserving the original symbolic representations and intentional ambiguity. This involved creating custom icons, lines, and polygons that accurately translated the participants' visual language into digital form.

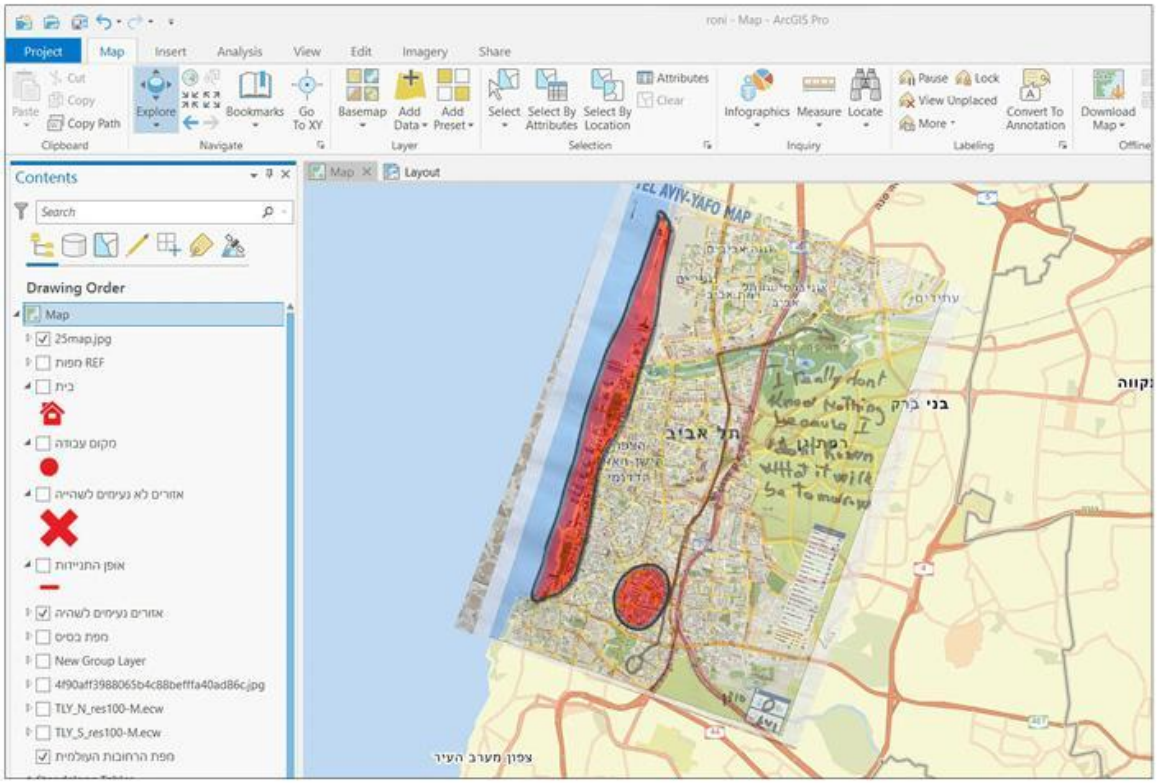

Figure 3. An illustration of the process of individually anchoring the hand-drawn cognitive maps within the GIS software. This methodological step enables the integration of the community's spatial knowledge, as captured in the participatory mapping workshops, into the formal structure of the digital cartographic platform

Second, is semiotic development, whereas a custom symbology was devised within the GIS platform to represent the various elements of the community's spatial knowledge, such as areas of comfort/discomfort, mobility patterns, and social networks. This visual language prioritised the protection of participant anonymity and the representation of collective experiences over precise geographic accuracy. The adaptation of GIS through community-generated symbology demonstrates how social design can transform surveillance tools into democratic platforms for community representation. This intervention shows Design's capacity to bridge technological systems with community-based spatial knowledge.

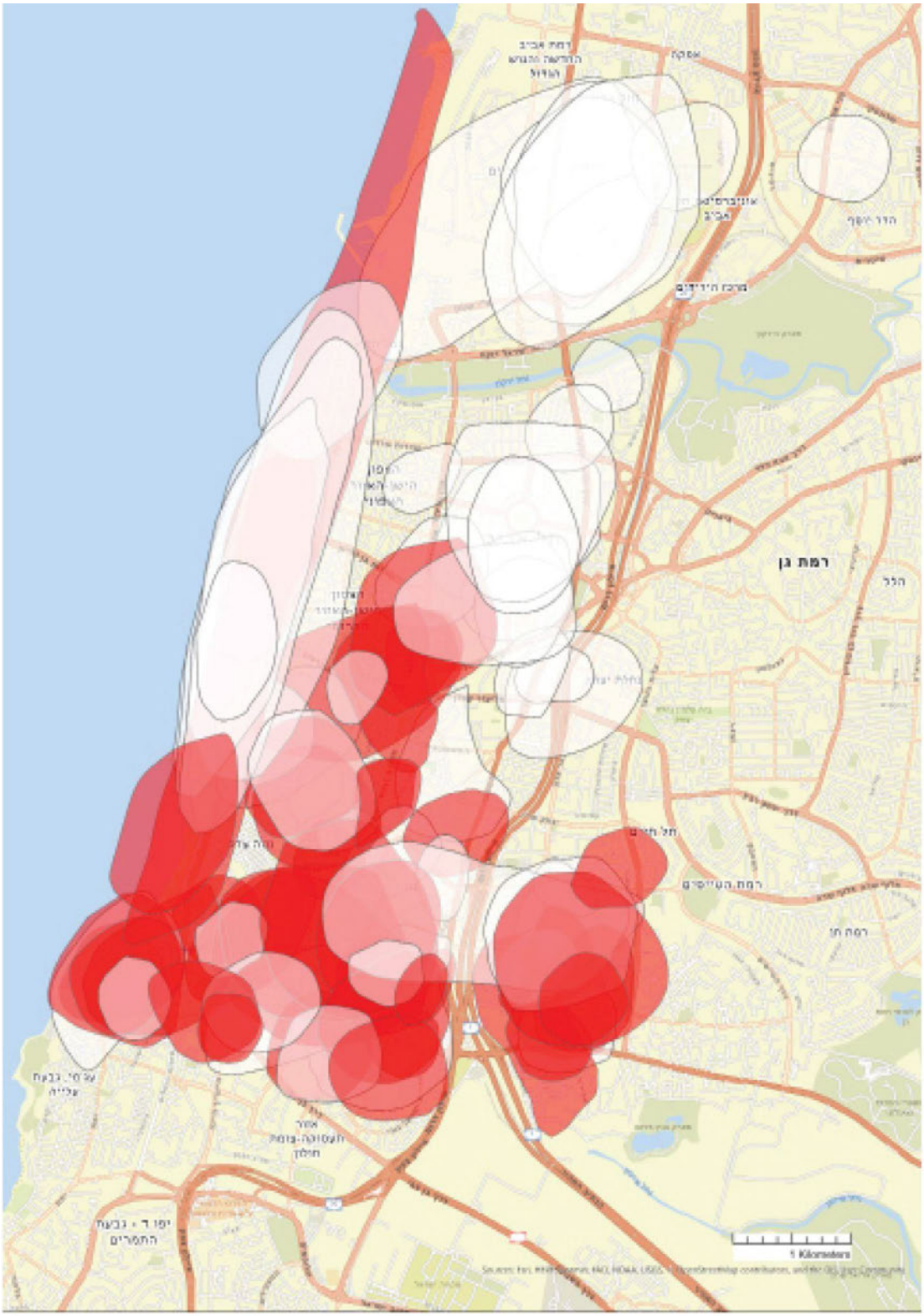

Figure 4. The map demonstrates the development of a custom symbology within the GIS platform to represent the community's spatial knowledge. The map employs red circles to denote areas of discomfort and white shapes to indicate spaces of comfort, alignining with the key mentioned in the methodology. The size of the symbols corresponds to the relative importance of each area in the collective spatial experience, while their abstract nature prioritises anonymity over precise geographic representation.

Third, layer creation, where multiple visual layers were created within the GIS, each representing a different aspect of the community's spatial understanding. These layers were designed to capture the complexity and dynamism of the participants' urban experiences, rather than presenting a static, univocal map. The technical possibilities and limitations of integrating these community-generated layers into the existing municipal GIS were explored, to identify

potential challenges and opportunities for subverting traditional power structures.

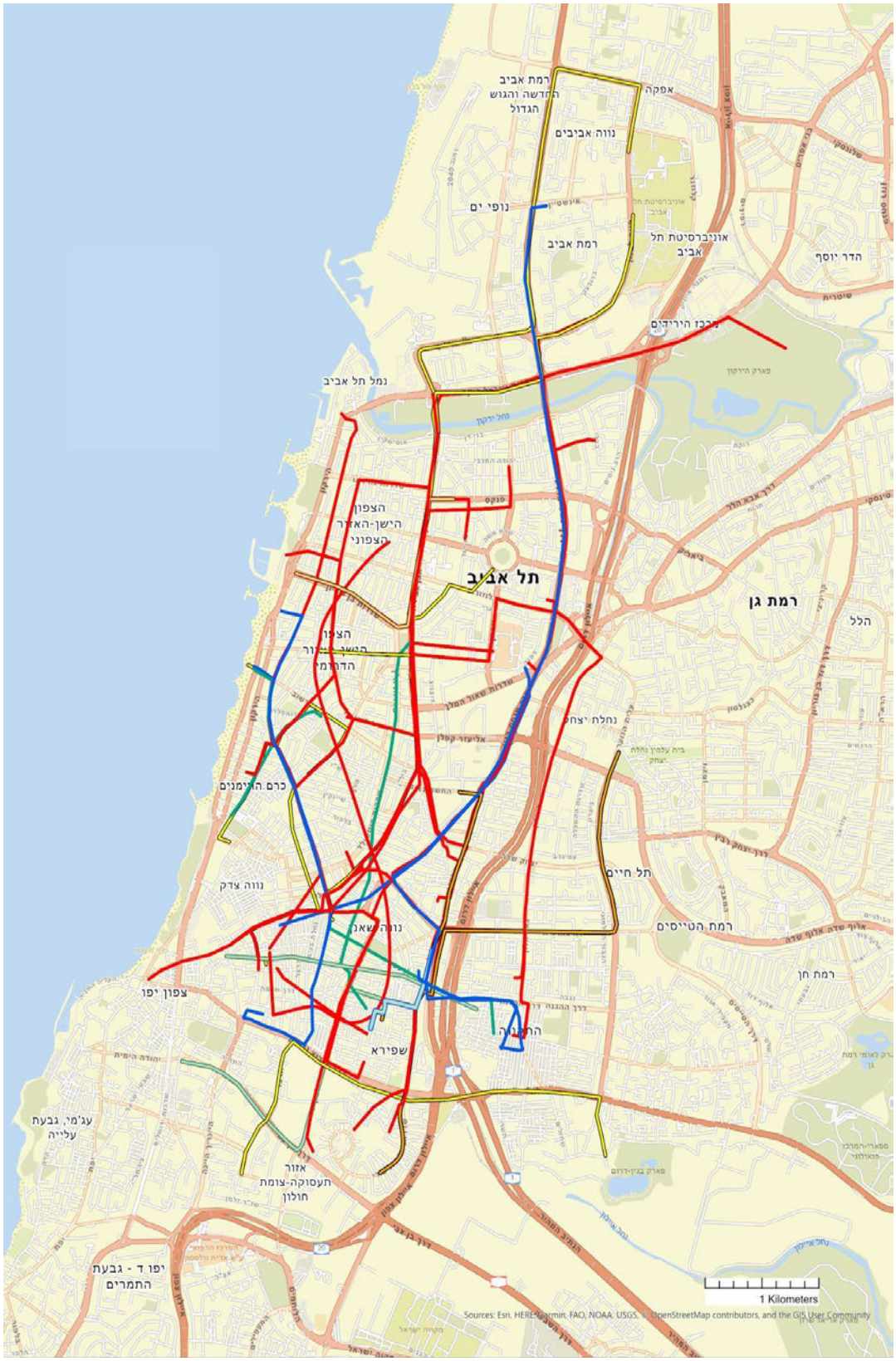

Figure 5. The map presents a visualisation of mobility data derived from the participatory mapping exercises conducted in the first phase of the research. The map does not indicate the specific destinations or origins of the participants' movements but rather highlights the main transportation routes and modes used by the West African community members in Tel Aviv.

This map (fig. 5) illustrates a key stage in developing a counter-cartographic approach to urban mapping, focusing on the mobility patterns and routes of a marginalised community. The colour-coded network of lines represents different modes of movement through the city, with red indicating bus routes, blue signifying electric bicycle paths, green denoting pedestrian walkways,

and yellow representing private vehicle roads. This map serves as a proof-of-concept for integrating community-generated data into formal GIS platforms, demonstrating the potential of counter-cartography as a tool for inclusive urban planning and development. By rendering visible the spatial practices of a marginalised community, this approach challenges the limitations of traditional cartographic methods, which often prioritise official data sources and top-down perspectives. Moreover, the visualisation of these mobility patterns provides a foundation for further analysis and intervention. Urban planners and policymakers can use this information to identify areas of need, optimise transportation networks, and allocate resources more equitably and responsively.

In this way, Figure 5 exemplifies the transformative potential of counter-cartography as a means of fostering more inclusive, participatory, and socially just approaches to urban governance. By centring the spatial knowledge and practices of marginalised communities, this method paves the way for a more nuanced, contextualised understanding of the city, ultimately contributing to developing more equitable and liveable urban environments for all residents.

A significant outcome of this phase was the successful integration of the community's presence into the GIS system in a manner that preserves the privacy of the community within a tool that is fundamentally designed around precise geographic coordinates. By developing a custom symbology and layering system that prioritised collective experiences and intentional ambiguity over geographic specificity, the research team could subvert the surveillance capabilities inherent in conventional GIS and create a space for the community's narratives to be represented on their terms. The images provided offer a glimpse into this process, showing how the GIS platform was adapted to accommodate the unique visual language and spatial knowledge of the West African migrant community. The resulting maps, while not intended for direct use by the participants themselves, serve as a powerful proof-of-concept for the potential of counter-cartography to challenge the hegemonic narratives embedded in urban mapping technologies.

7. Conclusions

This research demonstrates the transformative potential of integrating critical cartography with social design principles. The case study of West African migrants in Tel Aviv illustrates how intentionally designed symbolic systems can advance transformative urban representation. This visual methodology contrasts with the technological determinism of smart city initiatives, demonstrating how graphic design can transform digital mapping into a platform for community empowerment.

By developing "protective cartography," we challenge traditional notions of visual rhetoric while prioritising the safety and empowerment of marginalised communities. The approach proposed in this research is strategically important in two ways. First, following Bourdieu's famous ‘poison apple’ for social change, we believe that practical, daily change can occur only through the official platforms used by designers and planners. Second, adding a layer of social design to a field traditionally governed by urban planners, designers and engineers is crucial. By doing so we not only shift the focus on communities from only dealing (in the best scenarios) with public participation to visual representation in urban mapping. Therefore, we do not deal solely with practical solutions, but with a strategic redefinition of the role and responsibilities designers have in their communities.

Therefore, our methodology addresses "hermeneutical injustice" by creating new interpretive resources that give voice to marginalised spatial experiences. Through community-generated symbols and strategic visual opacity, we bridge "cartographic silences" and enact "thick mapping" that captures the complex nature of urban space. This potential tool must be added to current efforts to include local communities in urban planning and design. Aside from hearing their needs, we need to translate the urban language into understandable practices, thus this could be an important step forward.

In establishing graphic design as a crucial methodology for social justice in urban mapping, we show that effective spatial representation lies in the power of visual language to reveal, protect, and empower marginalised urban communities. By foregrounding the voices of those excluded from the map, we open up new possibilities for reimagining the city as a more just, inclusive, and equitable space.

The current research focused on developing an innovative methodology for counter-

cartography with West African migrant workers in Tel Aviv, stemming from an ideologic stance of working directly with communities rendered invisible by institutional knowledge systems. At this stage, the maps have not been formally presented to local authorities or urban planning bodies, but rather served as a theoretical-research foundation. Future research will need to address the challenge of integrating this knowledge into urban planning systems without compromising the autonomy and security of the documented communities. Currently, Jerusalem municipality if the only one to integrate a designated role of 'neighborhood planner', a person living within the community and mediating between residents and formal institutions. This is a positive direction, one which can integrate our suggested model when working with invisible communities. However, while extremely important, the full implications of our model demand further research.

The transformative potential of counter-cartography lies in its ability to challenge authorities' monopoly over spatial knowledge-production and to confront the hegemonic governmental paradigm that views mapping primarily as a tool for management and control. Following Peluso (1995), we suggest that working with local authorities in this context requires a fundamental transformation in their perceived role—from bodies that render communities visible according to political and bureaucratic needs, to partners who recognize communities' right to determine their own modes of representation. While parallel models of placemaking and tactical urbanism have created an impact around the world, the shift has yet to be unfolded in the Israeli context due to various socio-political and economic reasons.

The theoretical framework of "multiple geographies" enables us to propose a substantial epistemological shift to authorities—from a homogeneous and hierarchical conception of urban space to a heterogeneous vision that acknowledges the simultaneous existence of multiple spatial realities. Rather than implementing traditional GIS tools that flatten complexities, we propose hybrid platforms that enable marginalized communities to generate autonomous knowledge layers that preserve the ambivalence they require. The descriptive dimension of "ghetto by choice" that emerged in our research exemplifies how migrant communities develop complex spatial practices that refuse to be included in binary representation systems of visibility/absence or legality/illegality.

To incorporate counter-maps into urban decision-making processes, new types of collaborations must be developed that recognize the epistemological complexity of revealing the invisible. Migrant workers constitute an economic and social driving force operating in the marginal shadows of the city, and any urban planning that fails to account for their presence is based on a partial understanding of contemporary socio-cultural urban space. We propose two models for future collaborations:

- Hybrid Forum for Urban Planning: Development of an institutional framework that combines urban planners, government bodies, researchers (preferably, social designers, local or community-based urban designers. Urban anthropologists), and mediating agents from marginalized communities. These mediators, such as Traore in our research, would bridge institutional and community knowledge, using counter-cartography tools to represent knowledge in ways that do not endanger communities, yet echo the classic professional knowledge. In this model, communities maintain autonomy in representing their knowledge, while urban planners gain cognitive recognition of invisible spatial layers.
- Economic and Resource Recognition: Exposing the spatial knowledge of marginalized communities carries significant economic implications. In Tel Aviv, migrant workers constitute a substantial economic engine operating in the shadow of the formal economy. Recognizing their contribution means not only including them in urban representation systems but also allocating urban resources (infrastructure, services, public spaces) more equitably to meet their needs. Developing economic models based on recognition of informal economies will enable more inclusive urban planning that creates value for all city residents.

Full implementation of this approach will require local authorities to adopt what might be termed an "epistemology of deliberate non-knowledge" (see Mills, 2007)—an approach that not only respects communities' right to maintain spaces of ambiguity, but recognizes this data as an important addition to urban processes. Such transformation is not merely technical but marks a paradigmatic shift in how authorities understand their role in urban reality—from monopolistic producers of spatial knowledge to partners in constructing heterogeneous representations that respect the autonomy and uniqueness of marginalized communities.

Through these collaborations, counter-cartography can evolve from a research tool to a transformative practice, enabling urban planning that recognizes the multiple layers of urban

experience. Acknowledging communities and phenomena existing in the shadows of the city is not merely a matter of social justice but also the basis for more precise urban planning, founded on a deeper understanding of the forces shaping urban space.

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THE INTEGRATION OF PHYSICAL, SOCIAL AND VIRTUAL SCENES: RESEARCH ON SCENE CREATION IN RURAL SPACES FROM THE PERSPECTIVE OF SOCIAL INNOVATION

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ABSTRACT | Social innovation has emerged as a critical methodology for addressing global social challenges (Melece, 2015) and has been increasingly integrated into rural revitalization strategies, serving as a key driver for sustainable development and inclusive growth in rural areas (Castro-Arce & Vanclay, 2020). Currently, diverse spatial practices—including land art festivals, historical village renovations, eco-agricultural landscapes, and digital virtual experiences—have been implemented across rural regions worldwide, demonstrating complex interactions among geographical, cultural, ecological, and technological dimensions.

Originating from urban sociology, scene theory represents a novel paradigm for urban studies, positing that urban spaces are not merely physical environments but also "scenes" (Clark, 2013) constituted by cultural symbols, social interactions, and shared values—encompassing cultural values, lifestyles, and emotional experiences. Building on this theoretical foundation, this study adapts and extends urban "scene theory" to rural spatial research. From a social innovation perspective and incorporating emerging digital-virtual scenes, we propose an expanded "scene creation " theoretical model for future rural spaces. Through case study analysis, this model is applied to examine diverse rural practices and conceptual proposals across international contexts. The research

ultimately validates the applicability and guiding significance of the "scene creation " model in rural spatial transformation, while offering actionable strategies and reflections for rural revitalization in the digital era.

KEYWORDS | SCENE CREATION, SOCIAL INNOVATION, RURAL REVITALIZATION, RURAL SPACE

1. Introduction

With the rapid advancement of industrialization and urbanization, rural areas are facing a range of challenges, including imbalanced urban-rural development, inadequate infrastructure and population outmigration. These issues have further exacerbated complex challenges such as ecological degradation, rural hollowing, and cultural fragmentation. In recent years, social innovation has been introduced as a new development strategy for rural revitalization. By reconfiguring resources and constructing social networks, it has driven innovative development in rural areas across various domains, including service provision, employment opportunities, cultural activities, and ecological sustainability (Aldea Partanen, 2011; André et al., 2013; Copus et al., 2017; Dodd & Franke, 2011; Lindberg & Berg Jansson, 2016; Martinelli, 2013). This approach seeks to alleviate the "vicious cycle" of rural development from multiple perspectives (Christmann, 2017). Thus, social innovation is emerging as a crucial driver for promoting inclusive growth and sustainable development in rural areas (Castro-Arce & Vanclay, 2020) and has become an important research lens in rural practice.

1.1. The Interconnection of Internal and External Systems in Rural Social Innovation

Social innovation involves the adjustment and reorganization of existing elements in new contexts, akin to "new combinations" (Gillwald, 2000). As Schumpeter (1934) pointed out, innovation is not an isolated "flash of inspiration" but is achieved through continuous dialogue, interaction, and the recombination of resources. This type of innovation is rooted in the creative configuration of existing assets, encompassing diverse dimensions ranging from social capital to historical heritage, and from traditional crafts to cutting-edge technologies (Manzini, 2015). Furthermore, Copus et al. (2017) emphasize that social innovation not only relies on the participation of local resources but also requires interconnectedness across geographical and organizational boundaries. This is achieved through meaningful interactions with broader environments (Bosworth et al., 2016). Such interactions necessitate the establishment of networks and cross-boundary relationships within geographical spaces (Bock, 2016). As Warren (1967) highlighted, the key to influencing rural areas and their well-being lies in the interaction between internal elements and external environments. Rural areas are never independent; rather, they exist based on spatial and functional interdependencies (Davoudi & Stead, 2002; Potter et al., 2004). Therefore, Social innovation drives the bidirectional flow of rural resources and social capital by reconnecting the internal and external dimensions of rural society (Land, 2022). Consequently, the drivers of rural social innovation include both local (internal) resources and the close linkages with external environments (cities or other rural areas).

1.2. Multi-Stakeholder Participation in Rural Social Innovation

Social innovation not only provides new products, services, and methods but also mobilizes

relevant actors in novel ways, fostering cross-organizational and cross-sectoral collaboration (Moulaert et al., 2013; Nicholls et al., 2015). Rural areas are often regarded as small-scale communities of social life, where characterized by unique cohesion, sociability (Tönnies, 1955; Reimer, 1997; Hillyard, 2007), and expansive spatial fields, which create favorable conditions for unlocking the potential of social innovation. In rural social innovation practices, interdisciplinary stakeholders from government, enterprises and the private sector collaborate (Howaldt et al., 2018; Neumeier, 2012; Ziegler, 2017). These participants span different spatial and geographical contexts (Polman et al., 2017; Kluvankova et al., 2018), and together with residents form a diverse network of participants. Thus, Social innovation is not only related to local resources and spatial domains; the diverse participation of cross-regional entities marks the beginning of urban-rural interaction. As Neumeier (2012, p. 65) notes, social innovation is "a co-evolutionary learning process occurring within hybrid networks of human and non-human actors." Therefore, rural social innovation involves intricate relationships among local resources, spatial fields, and multi-stakeholder networks.

1.3. Cultural and Ecological Carriers in Rural Social Innovation

Rural areas encompass not only the physical spaces of residential settlements but also cultural significance and natural ecological domains, forming a complex integration of cultural and ecological resources. Traditional villages, as unique cultural spaces, are endowed with profound cultural connotations and emotional value by residents. As Chen (2015) notes, rural culture reflects not only reverence for and adaptation to nature, but also deep emotional ties to family and homeland, as well as the steadfast preservation of traditional customs. This unique cultural heritage provides intrinsic motivation for the sustainable development of rural areas. Consequently, the concept of social innovation has long been applied in the field of rural cultural heritage (Wang, 2009). China’s rural revitalization strategy emphasizes the protection of historical sites, natural landscapes, cultural environments, and intangible cultural heritage. Rural historical buildings, as important carriers of village culture (Chueng Nain et al., 2015), are particularly significant in contemporary society for their preservation, revitalization, and adaptive reuse (Cheng et al., 2020). Fu et al. (2021) have demonstrated a close relationship between the spatial patterns of traditional villages and local culture. Traditional architecture, as a witness to rural daily life, preserves unique socio-cultural memories of the region (Yue et al., 2023). In the European Union, rural innovation primarily focuses on the valorization of environmental protection and the diversification of economic foundations, a trend evident in rural tourism, bio-agriculture, and heritage-related initiatives (Borrup, 2006; Markusen, 2006). Nurdiani et al. (2020) propose creating creative economic spaces by leveraging local cultural resources, thereby improving regional conditions, optimizing spatial layouts, and enhancing the quality of the physical environment, ultimately generating economic value for communities. Social innovation plays a crucial role in integrating the inheritance of traditional cultural heritage with cultural tourism development. Through innovative spatial utilization and quality enhancement strategies, it effectively promotes tourism revitalization, achieving a symbiotic integration of traditional preservation mechanisms and modern development, and driving the revitalization

and sustainable development of traditional villages (Li et al., 2024).

Furthermore, social innovation serves not only as a new pathway for revitalizing traditional rural cultural spaces but also as a driving force for ecological landscapes and modern agricultural development. Through business model design (e.g., cooperative mechanisms) and technological innovation (e.g., soil remediation techniques), it promotes sustainable rural development. By combining technology and aesthetics, rural spaces are upgraded into multifunctional areas that integrate economic, ecological, and cultural roles. Social innovation also plays a crucial role in fostering residents' sense of identity and belonging to rural areas. To strengthen rural residents' sense of belonging and prevent population outmigration, social innovation practices in rural areas have been increasingly implemented (Aldea-Partanen, 2011; André et al., 2013; Copus et al., 2017). For instance, Portugal has promoted socially inclusive rural development through cross-sectoral art clusters, while Finland has facilitated the social integration of unemployed youth through art training programs in social living labs (André et al., 2013; Aldea-Partanen, 2011).

In conclusion, social innovation in rural spaces encompasses critical theoretical perspectives, including the interplay of internal and external systems, multi-stakeholder participation, and cultural-ecological carriers. These dimensions interact across geographical, cultural, ecological, and technological layers, forming a complex, interdisciplinary research domain. Similarly, scene theory—emerging as a novel paradigm in urban sociology—redefines urban spaces not merely as physical environments but as "scenes" shaped by cultural symbols, social interactions, and shared values. These scenes encapsulate cultural significance, lifestyles, and emotional experiences. Recognizing the conceptual synergy and potential correlations among these theories, this study proposes a "rural scene creation model" that integrates core elements of sociological scene theory with a social innovation perspective. Through case study methodology, the constructed model serves as an analytical lens to examine differentiated rural practices and conceptual proposals across global contexts. By systematically extracting operational logic from these cases, the research validates the model's applicability in rural spatial transformation while generating actionable strategies for digital-era rural revitalization.

2. Theoretical Support

2.1. Research on Scene Theory in Sociology

The term "scene" originally stems from the field of cinema, referring to an artistic expression that conveys specific information and emotions to audiences through elements such as dialogue, settings, props, music, costumes, and actors. From the 1950s to the 1980s, scholars like Erving Goffman and Joshua Meyrowitz introduced the concept of "Situation" into sociological research. They conceptualized it as a composite entity based on physical spatial dimensions and face-to-face social interactions, emphasizing that it is not merely a spatial concept but also an information system. In the 1990s, with the rise of cultural-creative industries and high-tech sectors in urban centers, scholars from the New Chicago School, including Terry Nichols Clark and Daniel Silver, integrated the concept of "Scenes" into urban sociological studies, pioneering a new paradigm for analyzing urban

development dynamics. This theoretical advancement transcended traditional dimensions of urban research focused on natural and social attributes, expanding into new layers of locational cultural consumption practices (Wu, 2022). The theory emphasizes the synergistic interaction between hardware facilities (physical infrastructure) and software systems (cultural consciousness) within specific spaces. In other words, the theory not only addresses the layout and functional characteristics of physical spaces but also prioritizes the exploration of underlying cultural values, lifestyles, and emotional experiences (Li et al., 2024). Later applied extensively to urban renewal, policy planning, and commercial strategies, scene theory emphasizes the strategic recombination of facilities and cultural symbols while considering the needs of specific cultural consumer groups. Scene theory comprises five core elements (Clark & Silver, 2016):

- Neighborhood communities;
- Physical structures;
- Diverse groups of people;
- Specific combinations；
- Cultural values (legitimacy, theatricality, and authenticity);

These elements form the theoretical foundation and source of this study

2.2. Extending Scene Theory to Rural Contexts with Virtual Scenarios

In recent years, with the development of rural cultural tourism under China's rural revitalization policies, rural cultural symbols and folkloric spiritual essence have garnered widespread attention. Scene theory has gradually expanded into rural studies, particularly in research areas such as rural public cultural spaces and traditional village tourism development. Wang (2023) suggests that scene creation may provide new pathways for the transformation and upgrading of traditional village cultural spaces, reshaping their cultural styles and aesthetic characteristics to achieve sustainable development. As an analytical tool, scenes bridge social structures and individual behaviors, reflecting the historical context and daily life practices of rural societies. Li et al. (2024) applied scene theory to evaluate the spatial quality of cultural and tourism resources in traditional villages, offering a scientific theoretical framework for the integrated development of rural cultural tourism, dynamic heritage inheritance, and sustainable utilization. Chen and Yan (2023) further utilized scene theory to enhance the cultural value of rural intangible cultural heritage towns, establishing systematic and clear pathways for cultural value elevation. Compared to urban scenes, rural scenes exhibit greater diversity due to their unique regional cultural continuities and geographical resource characteristics.

In 2014, Robert Scoble proposed that scenes also encompass multidimensional spaces such as cyberspace and virtual reality. With advancements in digital technologies, cultural space production has entered a virtualized phase, driving the emergence of immersive scene creation that combines virtual reality and real-world imagery through AI-assisted systems (Sirazhiden, 2020). Cutting-edge technologies are increasingly being applied in smart rural construction. For instance, high-precision scanning and AI modeling technologies enable millimeter-level replication of cultural heritage and rural landscapes. In Changyang Tujia

Village, Hubei Province, XR technology has been utilized to create virtual scenes featuring representative traditional cultural elements, allowing users to experience characteristic architecture and folk performances across temporal and spatial dimensions via wearable devices. These developments indicate that virtual scene creation enabled by digital technologies will become a critical frontier in the evolution of scene theory. Therefore, rural areas may transform into an innovative testing ground for "hybrid physical-digital environments", where tradition and technology can coexist in harmony.

2.3. Social Innovation-Driven Framework for Rural Scene Creation

In current practices of scene creation, excessive emphasis on cultural consumption often leads to an imbalance among cultural values, short-term interests, and sustainable development. For instance, the superficial extraction of cultural symbols and the application of standardized commercialization models risk cultural homogenization and disrupt heritage continuity. Furthermore, the marginalization of indigenous participation fractures original neighborhood networks, reducing residents to passive bystanders. These challenges are particularly pronounced in rural areas with significant differentiation, where balancing cultural vitality and social equity remains a critical concern during spatial transformation. As a driving force for inclusive growth and sustainable rural development, social innovation offers a perspective that comprehensively considers the rural spatial system (both internal and external), multi-stakeholder participation, and cultural ecological carriers.

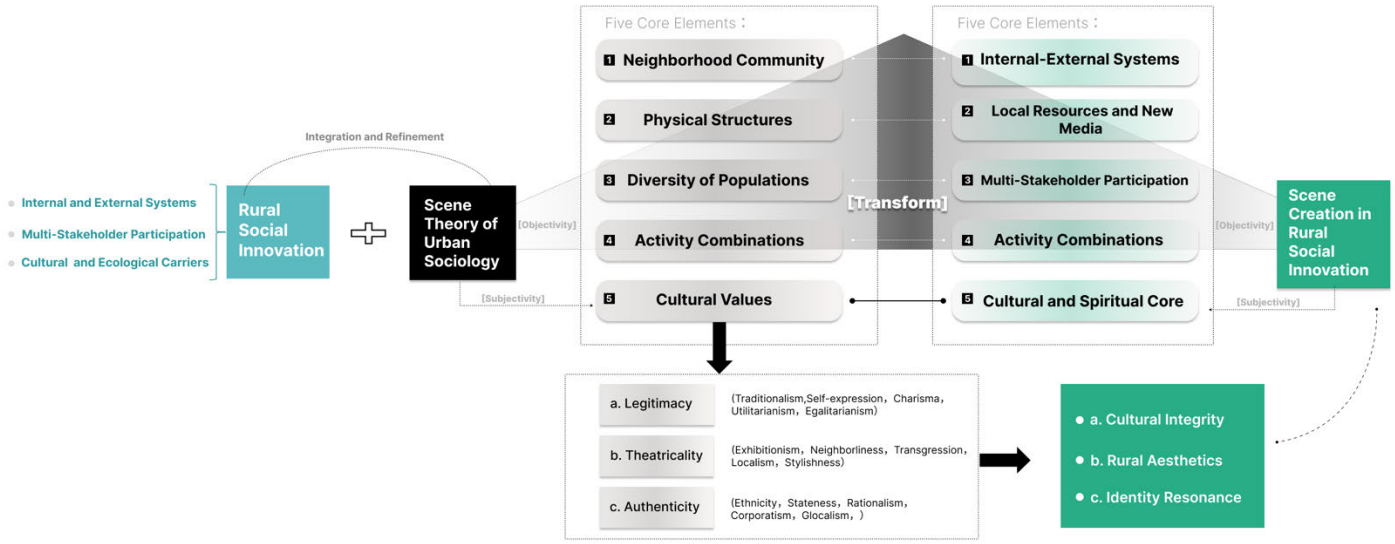

Figure 1. Theoretical model of rural spatial scene creation（figure from: Author drawing）

Therefore, guided by this perspective, this study adapts and expands the urban sociological "scene theory" framework to propose a theoretical model for rural scene creation (Figure 1). The model comprises five fundamental dimensions:

- Neighborhood Communities: Corresponding to rural internal-external systems, such as urban-rural industrial collaboration networks and smart virtual communities.
- Physical Structures: Integrating local resources (land, historical buildings, ecological features) with new media.

- Diverse Groups of people: Encompassing residents, external actors, government entities, and online community participants.
- Activity Assemblages: Featuring scene-based activities such as traditional folk events and inclusive social practices.
- Cultural Values: Extending rural cultural essence through principles of Authenticity, Theatricality, and Legitimacy—manifested through three dimensions: cultural integrity, rural aesthetics, and identity resonance.

These five dimensions constitute the core framework for rural scene creation.

3. Research Analysis

This study employs a case analysis approach, selecting exemplary rural practice cases and conceptual proposals from domestic and international contexts. These cases encompass five distinct scenario orientations: natural, cultural, ecological, and digital dimensions. Using the constructed "rural scene creation" theoretical model (as shown in Figure 1) as analytical and evaluative dimensions, the research further validates the model's applicability in rural spatial contexts. Through systematic extraction of patterns and operational logics from the cases, the study refines and expands the theoretical model by identifying sub-dimensional elements and actionable strategies for practical implementation.

Figure 2. Case Analysis （figure from: Author drawing）

3.1. Reconstructing Land-Based Natural Living Scenes through Artistic Media: The Echigo-Tsumari Art Triennale in Japan

The Echigo-Tsumari region is in the central-northern part of Honshu Island, Japan, covering an area of 760 square kilometers and including one city, one village, and four towns. In the 1970s, with significant changes in social and industrial structures, the region faced challenges such as continuous decline in agriculture and population hollowing out (Wang et al., 2022). Once an important rice production area and a place for people to live in Japan, the region has left behind a large number of abandoned terraced fields and

empty houses. In response to these abandoned cultural heritages, the art curator Kitagawa encouraged artists to create within the local environment, revitalizing these cultural legacies that once integrated people and land through the power of art. Thus, he initiated the first "Echigo-Tsumari Art Triennale" in 2000, which has been held every three years since then. The main creative directions include the integration and transformation of art and rural landscapes, as well as the functional and artistic transformation of vacant old houses and abandoned school buildings. Currently, the Echigo-Tsumari Triennale has been recognized by the United Nations World Tourism Organization (UNWTO) as a global demonstration case for "Sustainable Tourism in 2030", achieving rural innovation through five-sense experiences, regional culture, global connections, and cross-border cooperation.

The Echigo-Tsumari Art Triennale uses farmland as its stage, aiming to connect people with nature and achieve an artistic reconstruction of the natural living scenes of the land. The "scene creation " model framework for rural areas, mainly includes the following five-dimensional analysis. **(1) Internal-External Systems:** The art festival gathers artists from different regions outside the rural area to the inside, promoting continuous resource renewal within the rural area. The number of visitors from outside the rural area has increased from 163,000 in the first year in 2000 (Liu, 2009) to 540,000 in 2018, which greatly expanded the boundaries of the original rural community. In 2018, 56% of the participants were local residents, forming a co-creation model of hosts and guests, which stimulated the vitality of the rural area. A large number of young volunteers have been attracted to the rural area, effectively alleviating the problem of rural hollowing. **(2) Local resources and new media:** Artists make full use of local characteristic resources for creation. For example, in the "Empty House Project", Mexican artist Damiane Ortega chose an abandoned textile factory as the physical carrier, with the concept of connecting heaven and earth through fabrics and placed three-dimensional woven patterns and floating balls in the original physical space, attempting to evoke the memory of the local old industry through interlaced geometric patterns. Chinese architect Ma Yansong and his team MAD Architects utilized the traditional wooden framework of a century-old local house and extended a light and soft semi-transparent device - "Wild Bubble" outside. The bubble can host various functions such as performances, ceremonies, and gatherings. The local natural environment and traditional architectural structure are reflected in the new semi-transparent space, creating a scene of dialogue between humans and nature in a fusion of old and new, and a blend of reality and illusion. The team also renovated the 20-year-old Seikan Tunnel scenic tunnel. MAD installed water-drop-shaped mirrors on the original tunnel walls and used the color changes of lights to connect the external natural scenery with the internal cave in a surreal atmosphere, creating an immersive journey in a dreamlike state. In addition, Japanese artist Akiko Imai's work "For All the Lost Windows" in the fields, with white curtains and frames swaying in the wind, attracts visitors to feel the rhythm of the rural fields. The changing seasons of nature will bring different views to this window. Russian artist Ilya Kabakov's work "Terraced Fields" sets up human-shaped silhouettes on the terraced fields of the hills, representing each process of farming. The overlapping of text and patterns is like a "memory picture book", showing the living scenes that once existed on this land. **(3) Multi-Stakeholder Participation:** Local residents actively participate in the art festival activities, such as joining the volunteer team, managing restaurants, dormitories, and exhibition spaces, and organizing tourist tours. Visitors from outside the area participate in local farming activities, and enterprise organizers assist in the distribution of local products, forming a collaborative model of "government - artist - villagers - enterprises", and building a network scene of multi-party collaboration. For example, during the two busy farming seasons of rice planting and harvesting each year, a large number of previously abandoned rice fields will be claimed by outsiders, and people from all walks of life in the city participate in farming activities.

Figure 3. The figure depict scenes from the Echigo-Tsumari region in Japan, featuring artworks including Damian Ortega's textile factory transformation, 'Wild Bubbles', 'Time Tunnel' (Kiyotsu Gorge renovation), 'For Lots of Lost Windows', and 'Terraced Fields'. (figure from: Network)

Participants can receive some precious rice as "labor dividends", while the rice grown by local residents is redesigned and packaged by the art festival organizers and distributed to various restaurants. With the collaboration of artists, villagers, art festival organizers, and the government, the Echigo-Tsumari region has gradually regained vitality and formed a unique industrial combination and spatial scene. **(4) Activity combinations:** During the art festival, activities such as the Earth Environment Symposium, Art and Architecture Summer Camp, and Art Theater (including drama, dance, and concerts) are held, reviving rural areas through the power of art and promoting in-depth thinking about the relationships between humans and nature, and between humans. **(5) Cultural and spiritual core:** The artworks and their presentation methods not only do not disrupt the natural environment and original ecology of the countryside but also fully communicate with local villagers

during the intervention process, respecting their opinions and needs. It is more like a collaborative creation with the local residents. Neither the operation of art nor business has disturbed the residents' living order, reflecting the consideration of cultural identity in the process of scene creation.

3.2. Activating Historical Contexts through Architectural Acupuncture: The Renovation and Intangible Cultural Heritage Revitalization of Ancient Villages in Songyang County, Zhejiang Province, China

Situated in Lishui City, southwestern Zhejiang Province, Songyang County spans 1,406 km² and was established in 199 AD during the Eastern Han Dynasty, boasting over 1800 years of history. Its mountainous ancient villages preserve intact agrarian civilization and historical architecture. However, due to its remote inland location and relatively isolated geographical conditions, the region faces challenges of population loss and economic decline. Since 2014, Songyang has implemented systematic rural revitalization initiatives such as the "Old House Rescue Initiative." The county's renovation approach is through the adaptive reuse of small-scale public buildings. This strategy not only perpetuates historical contextual scenes but also activates the self-regeneration of ancient settlements—a methodology now recognized as the "Songyang Model." Today, the Zhejiang Provincial Institute of Urban-Rural Planning and Design employs digital technologies to create virtual environments, conducting 3D scanning and modeling of over 100 historical structures. The development of the "Ancient Villages of Songyang" digital twin system—integrated with the digital Old House Rescue platform, Tuyou Songyang digital interface, and other multi-platform tools—pioneers new paradigms for the digital conservation and utilization of traditional villages.

The villages in Songyang County have continued the historical and cultural scene in the countryside through site-specific architectural renovations and the construction of online digital platforms. According to the "scene creation" model framework for rural areas, the analysis mainly includes the following five dimensions. **(1) Internal-External Systems:** The cultural consumption spaces such as renovated guesthouses, museums, and experience workshops have attracted a large number of external urban visitors for tourism and short-term residence. The old buildings that were abandoned during the urbanization process have been transformed into new public spaces shared by both industry and culture. In addition, external tourists can also visit Songyang in a virtual digital space through VR and digital navigation technologies. The number of external visitors has increased by 65% year-on-year, achieving long-distance interaction between urban and rural areas, and the community boundary has extended from the physical level to the virtual space across time and space. **(2) Local resources and new media:** Designers rely on local architectural carriers to explore the representative cultural and industrial resources of the area and activate the development of the village through spatial renewal. Architect Xu Tiantian and her team, DnA Architects, have carried out "architectural acupuncture" - focusing on the renovation of characteristic spaces scattered throughout the village to unlock the key "acupoints" for rural development. For example, the Agricultural Museum in Pingtian Village, Sidu Township, is a renovation of the ancestral hall area in the existing spatial texture of the ancient village, turning it into a public cultural area of the village to showcase the agricultural culture and bamboo handicrafts of

Pingtian Village. During the renovation process, the rough texture of the original rammed earth walls was fully retained, allowing the new structure to better integrate into the original village texture. At the same time, traditional materials such as Mingwa were used in an interlaced arrangement on the roof, creating a fresh light and spatial atmosphere. Another example is the "Weave" Art Museum designed by Team Bldg, where the designers conducted detailed measurements of the surrounding old houses. To respond to the local traditional weaving techniques, the designers used aluminum grilles to weave a layer of "skin" on the existing building carrier that changes with the weather. This interlaced facade like "yarn" creates a light and transparent architectural volume, allowing the new scene to integrate into the local architectural complex with the characteristics of traditional culture. In addition, Songyang County's abundant bamboo forest resources also provide physical carriers for renovations, such as the Bamboo Forest Theater in Hengkeng Village, which is located at an altitude of 1,080 meters. The theater is woven from locally grown bamboo, and its form changes with the metabolism of the bamboo grove, forming a vibrant cultural space together with local drama performers.

Figure 4: The figure shows the architectural acupuncture scenes in Songyang, including the Agricultural Museum in Pingtian Village, the "Weave" Art Museum, the Bamboo Theater and the Brown Sugar Workshop (figure from: Network).

(3) Multi-Stakeholder Participation: In addition to the guidance of architects, the "Songyang Model" also involves a large number of local villagers in the construction process. For example, when DnA Architects renovated the sugar workshop, the local village director and villagers were jointly responsible for building the stove. In the later operation, enterprises and local villagers participated together. Some voluntarily cleaned the alleys, some brought crops to the restaurant as ingredients, and some demonstrated the process

of peeling radishes and grinding tofu to visitors in the agricultural museum, forming a co-prosperity development model of "government guidance + collective participation + market investment + villagers' shareholding". **(4) Activity combinations:** The sugar workshop was expanded into a theater space, combining sugar production and performance production, becoming a public cultural exchange place in the village. Visitors can experience the seasonal sugar-making activities and the inheritance of the sugar-making craft. The Bamboo Forest Theatre provides villagers with diverse activity spaces. Traditional village sacrificial activities, local high-pitched opera performances, and leisure camping for tourists have all been rejuvenated through the theatre. **(5) Cultural spirit core:** In the sugar factory, the space for sugar production has transformed into a stage theatre. The steam rising from the earth stoves during sugar boiling, combined with the workers moving among them, preserves the traditional craftsmanship as a whole through performance. Spotlights illuminate these "dancers" in the space, converting the production process of traditional craftsmanship into an entertaining performance, condensing and replicating the aesthetic of rural culture. Moreover, compared to the overly commercialized renovations in traditional rural space transformations that are detached from the daily lives of local villagers, the renovation in Songyang County not only retains and activates the local traditional industries, showcasing the processing and production of local specialty products to tourists, but also closely relies on the existing architectural space carriers of ancient villages, embodying the authentic transmission of culture.

3.3. Driving Resilient ecological Landscape Scenes through Technological Innovation: Agricultural Innovation and Hybrid Circular Landscapes in Dutch Rural Areas

The Netherlands is the world's second-largest exporter of agricultural products. However, due to its scarcity of land and rural resources, its agricultural technology has become highly intensive. Its development direction has shifted from single agricultural development to multi-objective landscape construction, vigorously promoting sustainable agriculture and services to create resilient landscape scenes. In recent years, the Netherlands has adopted various innovative measures in digital rural construction. For instance, in the farmlands of Flevoland Province, the Grow project was launched, where artist Daan Roosegaarde and his studio created an innovative agricultural art project through interdisciplinary experiments. The core of this project lies in integrating photobiological technology with agricultural production to explore new paths for sustainable rural agriculture. Additionally, North Holland has explored new landscape scenarios for circular agriculture within the existing framework of polders, peat meadows, and reclaimed land. For example, in the fertile polder landscape of Kop van Noord-Holland, high-yield farmland and horticultural agriculture are developed for the global market. The originally monotonous and empty farmland has gradually transformed into a differentiated landscape featuring a combination of mixed forms and functions, including large-scale precision production by drones and high-tech farmers. In the peat meadow area of Laag-Holland, extensive dairy farming is carried out. In the reclaimed land areas, both farming and vegetable cultivation are conducted, responding to the demand of nearby urban consumers for regional healthy food through short-chain measures, and gradually evolving into water-based urban landscapes close to the city.

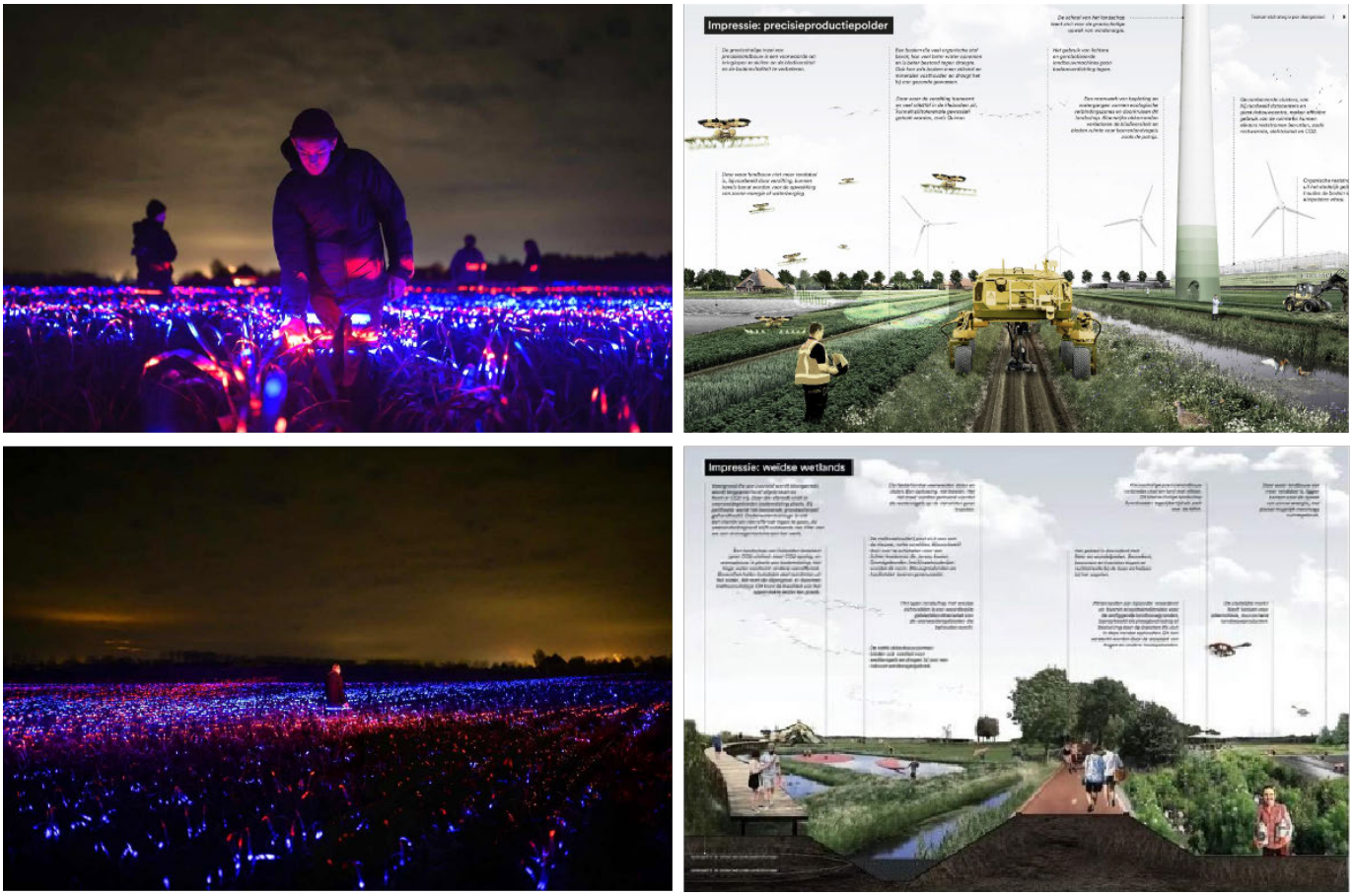

Figure 5. The figure showcase innovative agriculture and circular landscapes in the Dutch countryside. (figure from: Network)

The innovation of technology has greatly driven the resilient ecological agricultural landscape scene in the Dutch countryside. According to the rural "scene creation" model framework, the analysis mainly includes the following five dimensions. **(1) Internal-External Systems:** In North Holland circular agriculture, the functional update of the original landscape and the activation of soil biotechnology have created a clever interweaving of raw materials, energy, water and waste circulation between cities and rural areas. For example, organic waste and waste flows from cities are ingeniously utilized in the polder landscape, where some organic matter keeps the sandy clay of the polder vibrant. The circular agriculture in the countryside provides food for big cities like Amsterdam, while cities provide green residual flows to the farmland to maintain soil fertility and health. **(2) Local resources and new media:** In the Grow project, a two-hectare local farmland is fully utilized as the carrier, combining photobiology technology with agricultural production. The project uses red, blue and ultraviolet LED lighting systems to precisely intervene in the light of crops, promoting plant growth and reducing pesticide use by 50%. At the same time, it combines technology and art to reshape the agricultural landscape. In addition, the circular agriculture in North Holland fully utilizes the original landscape framework such as polders and peat meadows, and selects appropriate biotechnologies and landscape spaces based on their physical characteristics, making full use of the soil sustainability, biodiversity and high-quality productivity of the region. **(3) Multi-stakeholder participation:** The circular agriculture region in North Holland not only provides new crop planting opportunities for farmers, such as the biodiversity farmers in Laag-Holland, but also becomes a water-based landscape space, with a network of walking and cycling paths

scattered throughout, attracting urban people for ecological experiences. Urban tourists and residents can directly purchase green crops from farmers and help with the harvest during their visits. **(4) Activity combinations:** The Grow project breaks through the single production activity of agriculture and endows farmland with multiple roles such as energy production, cultural education and leisure recreation. At the same time, it attracts tourists to experience the "dancing farmland". The water-based landscape in the North Holland circular agriculture project not only protects biodiversity through wetland vegetation, but also serves as a leisure trail to attract tourists, achieving the generation of production, ecological recreation and harvesting and purchasing activities. **(5) Cultural and spiritual core:** The polder landscape is a historical rural landscape with Dutch characteristics. Through technological innovation, a model of joint farming by machines and high-tech farmers has been created. On the one hand, it preserves the regional characteristic farming culture in its original form. On the other hand, the participation of technology enables the development of the complex traditional scene in a legitimate way in modern society. Interdisciplinary art and agriculture projects transform agricultural scenes into dynamic light and shadow art, dramatically showcasing the aesthetic features of agricultural culture. The innovative path of the Dutch countryside proves that the agricultural landscape in the countryside is not only a production space, but also a testing ground for technology.

3.4. Empowering Digital Scenes through Installation Technology: Selected Installation Designs from Various Regions

From the perspective of elements in rural spatial scene creation, digital technologies have significantly empowered diverse immersive scenarios within rural spaces. **Local resources and new media:** In this series of digital scenario cases, the inherent physical resources within rural spaces are fully utilized, acquiring enhanced narrative and functional dimensions through digital media empowerment. For instance, teamLab's digital interpretation of the original bamboo forest environment in Japan represents a profound exploration of spatial atmosphere within physical spaces, skillfully integrated with historical narratives embedded in the locale. Another exemplary case is Tsinghua University's light art installation "Warmth", which thoughtfully preserves traditional weaving techniques. Through meticulous research into local pine forests, birch bark materials, and regional tree bark painting crafts, the project ultimately adopted the intangible cultural heritage craft of "Shoubian Hongliu" (hand-woven red willow) from Xikou Village in Arxan for creative expression. Building upon this foundation, the installation achieves a harmonious integration with modern light and shadow technologies, ultimately depicting a heartwarming scene of family embrace intertwined with the joy of mountain wilderness. Furthermore, the "Ladder-Party Theater" in Aiyuan Town, Jiangxi Province demonstrates innovative spatial adaptation by incorporating dual-functional elements - everyday ladders transform into agricultural drying racks during harvest seasons. This theatrical space actively revitalizes quotidian objects through performative reinterpretation, essentially curating living scenarios that bridge rural production and cultural practice. **Activity Combination:** Digital scenarios inherently represent an experimental combination of cutting-edge activities that attract visitors and encourage social media engagement. These innovative settings not only enhance the richness of visitor experiences

but also empower local residents through novel technological applications, creating new forms of entertainment and enriching their daily life experiences. **Cultural and Spiritual Core:** Digital technologies have emerged as a novel medium for expressing rural aesthetics. When traditional village spaces integrate modern light-shadow technologies - exemplified by Tsinghua University's art installations and Japan's teamLab exhibitions - the cultural narratives and spatial characteristics embedded within these environments gain more holistic articulation through digital means. Meanwhile, innovative applications like the mobile AR system at Saitama Municipal Japanese House Garden demonstrate sensory visualization, enabling visitors to directly perceive the essence of springtime vitality and chromatic radiance. This approach also represents an immersive expansion of existing spatial stylistic expressions.

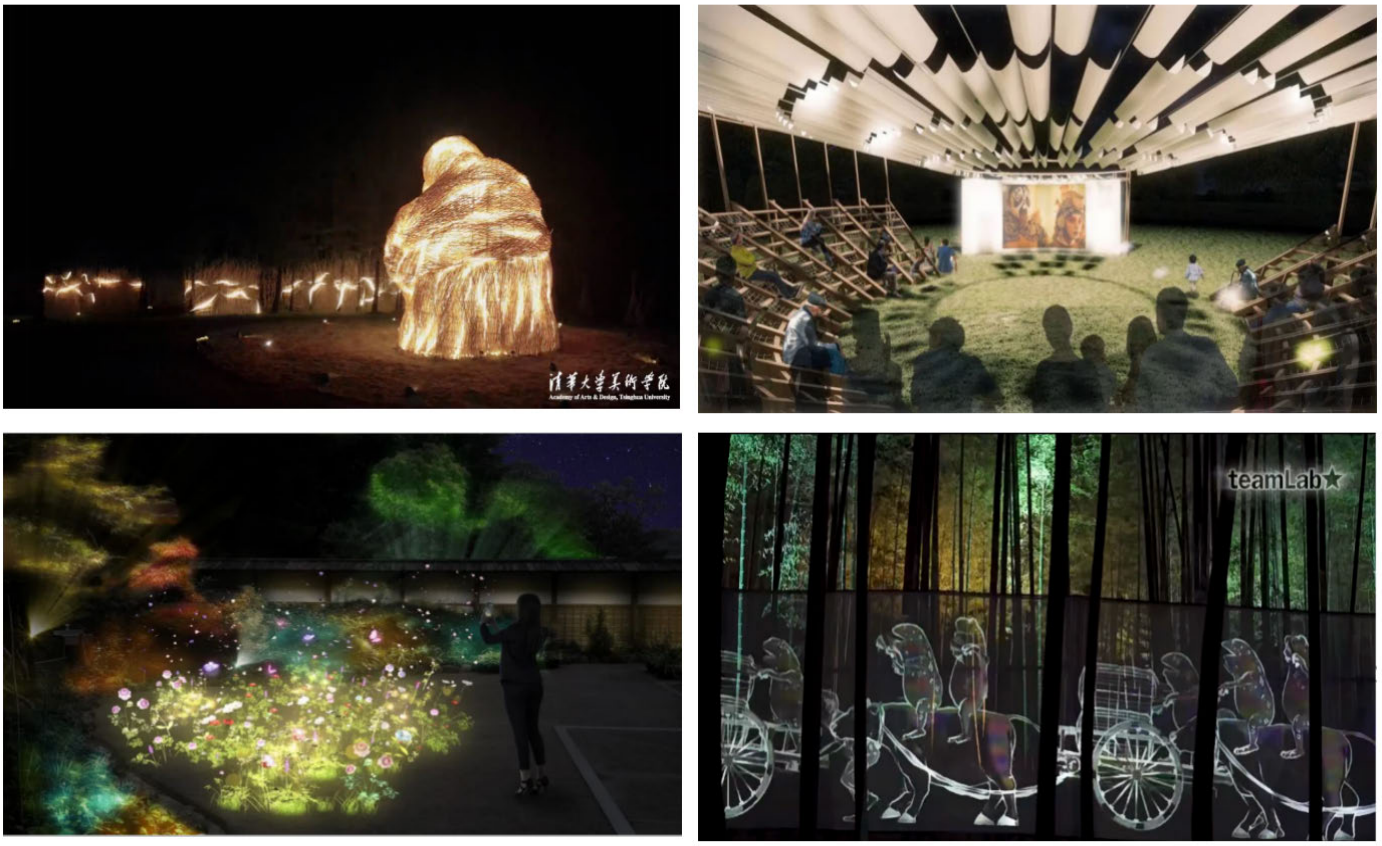

Figure 6. The figure are respectively: Light art installation "Warmth" - Tsinghua University, "Climbing the Ladder -party Theater" - Jiangxi Province, NAKED, INC.- Sakaki City Japanese Civilian Home, Team lab - Japan (figure from: Network)

4. Discussion

From the analysis of various types of cases in different regions, it can be seen that the "scene creation" theoretical model is applicable and instructive in the rural space. Each relatively successful rural revitalization case involves the consideration and deployment of five core elements. Table 1 presents a horizontal comparison and summary of the above three relatively complete rural practice cases, from which some commonalities in rural space transformation can be observed. First, these practices are all greatly expanding the boundaries of rural communities and promoting exchanges between the internal and external systems of the countryside. Whether it is the Echigo-Tsumari Art Triennale in Japan or the rural stay

Table 1. Comparative Table of Horizontal Case Studies on Scene Creation.

Five Elements of Scene Creation / Cases	Internal-External Systems	Local resources and new media:	Multi-Stakeholder Participation	Activity Combinations	Cultural and Spiritual Core	Scene Type
Echigo-Tsumari Art Triennale, Japan	Host and guest co-creation broadens the boundaries of the art community	Revitalizing abandoned houses, land art	Artist community - Indigenous people - Business - Tourists	Seminars, summer camps, art theaters	Rural aesthetics, cultural identity	Land+ Art
Historical Villages in Songyang County, China	The online and offline cultural context space shared by hosts and guests	Architectural acupuncture, cultural context industry	Government - enterprises - villagers - tourists	Intangible cultural heritage theaters, sacrificial ceremonies, cultural activities	Cultural aesthetics, authentic expression	Architecture + Culture
Innovative Rural Landscapes in the Netherlands	Sustainable ecological closed loop in urban and rural areas	Polder landscape, ecological technology	Government - Artist - Farmer - Tourist	Ecological rest and recreation experiences	Technical resilience, agricultural aesthetics	Technology + Agricultural

experience in Songyang County, China, they are all attracting external resources to join the local network by creating local characteristic attractions, forming a new pattern of urban-rural symbiosis. It can be seen that the countryside and the city are inseparable, and the countryside seems to be a complementary coupling body to the city. Therefore, the "internal and external systems of the countryside" element seems to be the boundary that the "scene creation" can reach. Secondly, local resources are the decisive factors in determining the design direction and scene type of each rural area. From the cases, it can be seen that each rural scene fully relies on existing resource carriers, including hard resources such as land, buildings, and farmland, as well as soft resources such as industries, customs, traditions, and technologies. Through the combination of resources and emerging creative media by artists, designers and other creative workers, the process of scene creation is completed. From the cases of cutting-edge digital installations, it can be seen that digital technology has transformed local resources into immersive experience fields. The vast rural space provides an experimental stage for this, and this will also be an important form of expression in future scenarios. Furthermore, the hollowing out of rural space after the urbanization process is a common challenge currently faced by rural spaces, and guiding people to return to rural land is the direction that the above cases are striving for. By creating more diverse productive types

and experience opportunities, a richer combination of activities is created to attract diverse participants to join the new space. Finally, the cultural and spiritual core of the countryside is also the driving force that distinguishes the future development of the countryside from that of the city.

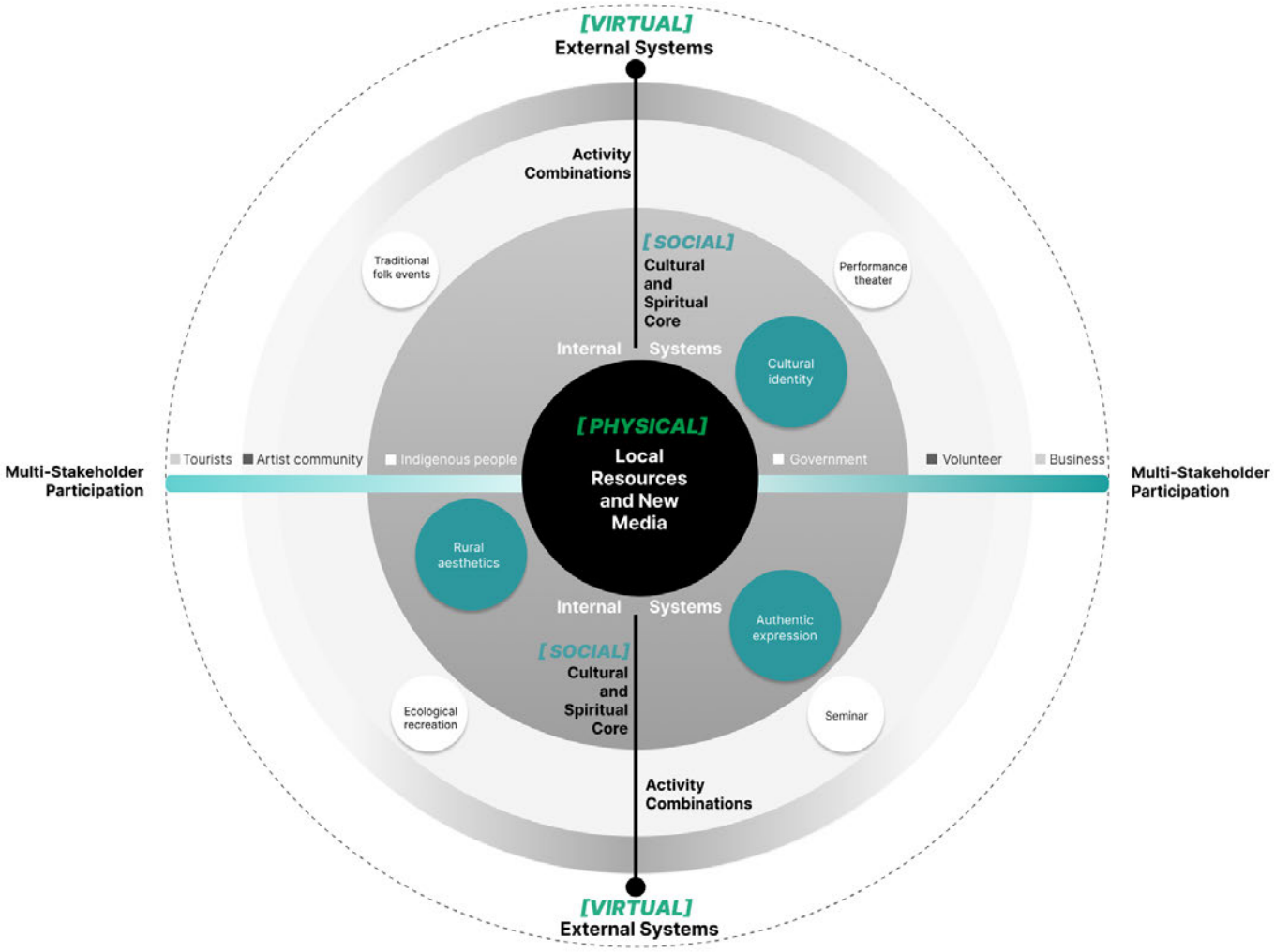

Figure 7. The system framework of "scene creation" elements from the perspective of social innovation (figure from: Author drawing)

On the other hand, the coordinated role of the five elements of scene creation achieves the completeness and vitality of scene creation. From the cases, it can be seen that the combination of the "local resources and new media" element and the "cultural and spiritual core" element plays a key role, with the former being like the design means and the latter being the design goal. In the Songyang Brown Sugar Workshop, the inheritance of traditional sugar-making culture and motion aesthetics is expressed by the designer through the designed "stage" space medium. Secondly, the combined effect of the "local resources and new media" element, the "diversified participation subjects" element, and the "activity combination" element represents the necessary conditions for the generation of stories in the scene - location, characters, and events. Designers or creative workers create "location" scenes from the originally lost and desolate land resources or idle building spaces, and various participants

continue to narrate the stories of the scenes, including local residents, artists, tourists, enterprises, etc., forming multi-level "story characters ". Moreover, cultural value elements serve as the lifeblood of all other elements in the scene creation process, integrating fading rural memories into the scene beyond the constraints of time and space. This cultural value not only enhances villagers' cultural identity but also attracts the attention of external personnel through the design of scene creation, further highlighting and expressing the authenticity of rural aesthetics and culture. Thus, it can be seen that the "scene creation" theoretical model holds significant guiding value for the transformation process of rural spaces with local characteristic resources. The interaction among various elements can endow scene creation with lasting vitality (as shown in Figure 7).

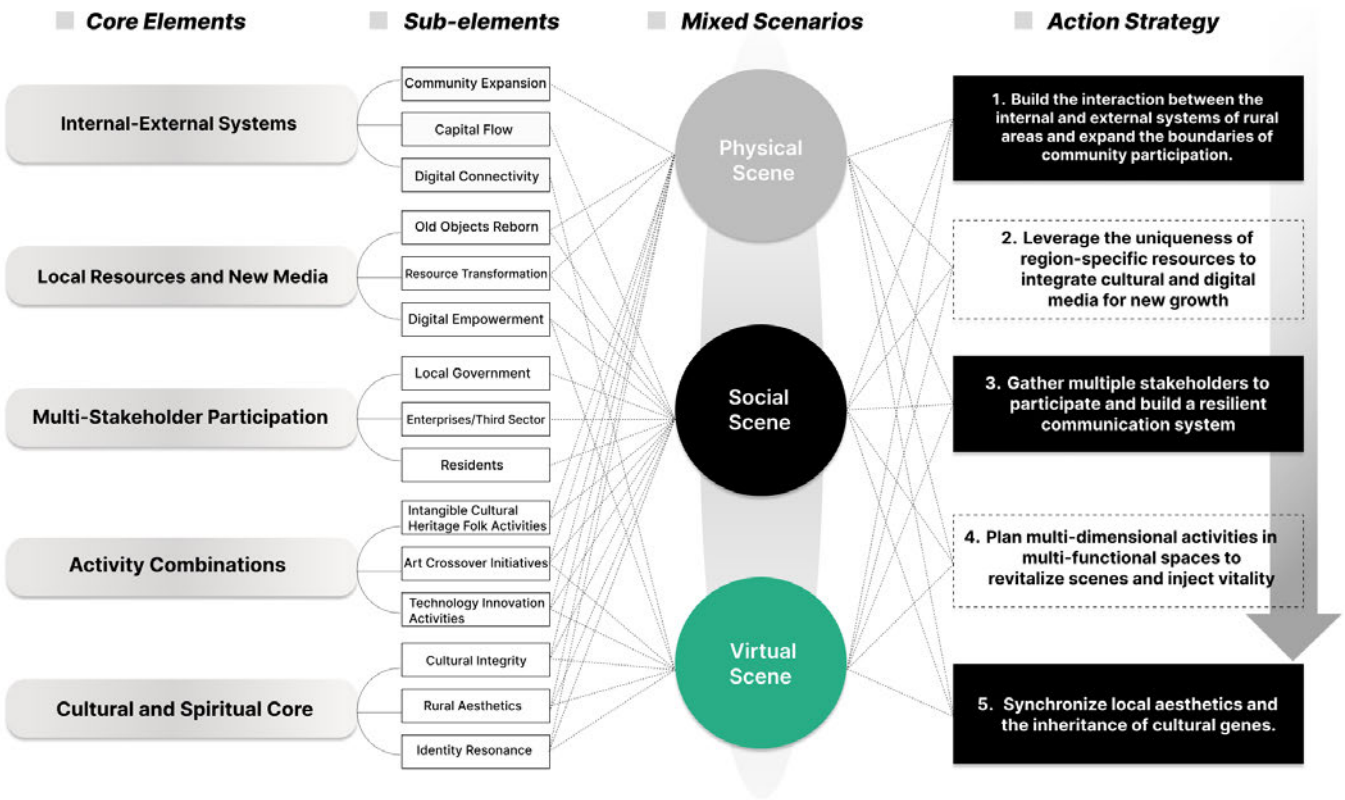

Figure 8. The theoretical model and action strategy system for rural "scene creation." (figure from: Author drawing)

Based on the theoretical model of rural scene creation and the logical factors extracted from the case, the action strategies for future rural space scene creation were constructed (as shown in Figure 8). Under the guidance of the core five elements of "scene creation", different sub-elements were derived to target specific application scenarios. The circular interaction mechanism of these scenes promoted the transformation of rural space from "physical existence" to "meaning production", achieving the integration of rural physical, social and virtual scenes, and thus obtaining the action strategies in the process of innovative rural scene creation. First, it is necessary to Build the interaction between the internal and external systems of rural areas and use digital technology to dynamically expand the boundaries of community participation. Secondly, decode the regional resource code and transform the physical space into a mixed reality field carrying cultural memory. Utilize the uniqueness of region-specific resources to integrate cultural and digital media innovations. In addition, multiple stakeholders' participation should be integrated to build a resilient network ecosystem and stimulate the

original driving force of life innovation through narrative interpretation and event occurrence. Plan multi-dimensional activities in multi-functional spaces to activate scene revival and vitality. Finally, by synchronizing rural aesthetics and the continuation of cultural DNA, a complete rural spiritual culture can be cultivated.

5. Conclusion

This research constructs a theoretical model of "scene creation" in future rural spaces through literature review and theoretical research. By analyzing and extracting the logic of five different scene-oriented cases, including natural, cultural, ecological, and digital, it provides action strategies and thoughts for rural revitalization and other practical activities in the digital age. From the perspective of social innovation, scene creation reconfigures and designs the five elements of the scene, endowing rural spaces with vitality. This shift enables the focus to move from merely physical spaces to mixed scenes that incorporate cultural and digital virtual elements. The theoretical model and action strategy system of rural scene creation aim to promote the transformation of rural areas from "physical existence" to "meaning production", achieving the activation and value enhancement of rural spaces. This study initially extends the core of social innovation theory and scene theory to rural spaces and attempts to verify the universal applicability of the theoretical model through typical cases. However, due to the limited sample size of case analysis, there are certain limitations. As the influence of digital technology on rural scene creation and the application of the theoretical model in practice continue to develop, the specific contents of the five elements of the scene will also change further. This is a topic worthy of further exploration in the future.

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The Mixture of Nature and Culture in Social Context and Artistic Research

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Abstract

Nature was and continues to be the first teacher of humanity, it serves as a compass for all sciences. Since we live amid globalization, there is also an escalation of cultural contact that promotes mutual understanding worldwide. The perpetual conduct of research on nature and culture promises to advance our knowledge of development worldwide and to inform culturally sensitive programs and applications. Focusing on the connection between nature and culture, we applied the Empirical approach and Practice-based research as the main methods. Through the artistic project "Nature or/and Culture", we aimed to encourage students to develop ideas and create artworks that are inspired by the mixture of nature and culture. Students experimented with various elements of nature while introducing cultural elements or contexts into their ideation process. They worked collaboratively and interdisciplinarily to generate their design solution and represent contemporary life and issues in society. The outcomes of the project demonstrated the integration between nature and culture with contemporary aesthetic conception and ideation, whilst at the same time representing the connection between contemporary culture and technology.

Keywords: Nature, Culture, Social Issues, Practice-based, Participatory Art

Overview

As a great source of inspiration, nature has served mankind for thousands of years. Nowadays, the common practice of art and design inspired by nature are usually associated with a sequence of efforts to understand, synthesise, and imitate any natural object or phenomenon either tangible or intangible form, which allows us to obtain improved insights into nature (Katiyar, Goel, Hawi, & Goel, 2021). Often seen as opposite ideas (Borghini, 2019), 'nature' and 'culture' are defined variously. Some people see 'culture' as consisting of humans and their products and 'nature' as comprising whatever is unaffected by humans, whereas others see a mixture of 'nature-culture' that integrates humans, other animals, and plants (Simberloff, 2018). The notion of this mixture has inextricably intertwined histories of postmodernism and poststructuralism (Haraway, 1999). Thus, design based on nature is not a new concept since mankind has always looked to the natural world for inspiration (Conrad, Lofthouse, & Escobar-Tello, 2016).

Following the initial concept of 'nature-culture', we attempted to do a small-scale experiment regarding the topic through an art and design project at university. As educators, we would like to reflect on how our students, as the young generation, interpreted the notion and how they implemented their knowledge into artworks or artefacts. It was essential for students to put their perceptions into artistic practice since art could inspire conversations and help them to rethink and analyse their experiences (Herman, 2016). We applied practice-based and empirical methods to our students and let them do various artistic experiments in the "Nature or/and Culture" project. We aimed to assist and give them opportunities to observe, investigate, analyse, create, and implement their knowledge through the artistic project.

The experiment was conducted in the classroom and lasted for two weeks. Students started to do initial research and gather knowledge through field observation and literature review. They had to work in groups, constantly discussed, and exchanged ideas related to the topic. The main challenge was that students could not bring up art and design ideas related to the context of biomimicry, biomimetics, or sustainable design, instead, they had to connect the idea of nature with contemporary culture. Since the experiment focused on students' perceptions of 'nature-culture', it was important to understand their initial hypothesis and how it worked in their context. In general, students came up with fascinating interpretations regarding the mixture of 'nature-culture' and how they would like to implement the knowledge into their artworks. Afterwards, students had to finalise their concepts, produce their artwork, and present the concepts based on the creative process, Figure 1, from research to final work with satisfactory outcomes.

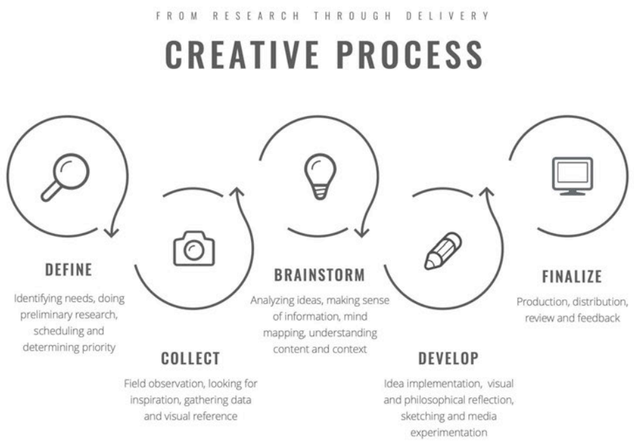

Figure 1

The "Irreversible"

During the artistic project, we originally experimented with a total of five groups of students. However, because of the space limitation, we would only discuss artwork from one group of students in this research. "Irreversible", the artwork that we found very distinctive, focused on online communities, especially the negative view on IoT (Internet of Things) and the dark side of its users or Netizens (Citizens of the Net), Figure 2. Instead of focusing on traditional or ancient cultures, the group decided on contemporary culture, especially the Internet world and its global network.

Figure 2. The "Irreversible" artwork

Figure 3. The spider's web in nature

For this experimental project, the group did not discuss the perspective of the dark web from a criminology viewpoint. Instead, following the initial brief and empirical method, students focused on their daily life experiences as avid users of the Internet. The students, as digital natives, considered themselves as part of the active Internet communities. While the development of the Internet provides users with resources and convenience, it also has a negative impact on human psychology. There is a close relationship between the use of the Internet and users' mental health such as anxiety and depression, fickleness, emotional influence, panic, insecurity, paranoia, cyber violence, overconsumption, blind obedience, crime, violent tendencies, and culture shock (Gao, Wu, Wang, Bi, & Du, 2021). These negative user psychology, especially anxiety and depression, emotional influence, and cyber violence, are quite common and have become essential social issues nowadays.

As a global platform, the Internet is a network of networks that allows users to connect and develop within its society. Students explicitly used the word "web" and "network" to relate the notion with the spider's web. They connected the Internet culture with the nature of the spider's web, which we discussed together during the research process. Further explanation of their concept focused on the characteristics of the spider's web, for example: it was beautifully connected, the nearly invisible thin thread, dangerous in nature, Figure 3. Students used the object as a metaphor to reflect the context of websites in the Internet world. The beautiful connection of the Internet entices users to join its global networks and causes an addictive experience. Current studies have found that those who used the Internet more often were more likely to experience anxiety and discomfort compared to when such users did not use the Internet. The nearly invisible thin thread of the spider's web could represent the netizens and their identities. The Internet society is considered an "invisible" community since they only connect globally through the network. This situation may cause emotional influence and insecurities within the Internet global society since there are possibilities of fake identities or communities. The invisible nature of the Internet can be dangerous due to the lack of supervision from the authorities. In addition, the spider's web itself is a structure that is generally meant to catch prey, which means it is dangerous in nature. This characteristic may represent the danger of cyber violence on the Internet, especially on social media platforms. Netizens can become either victims or perpetrators on the Internet since it is very easy to attack other people with violent words and use extreme views and language online. Research has found that online bullying and harassment, including threats or unwelcome and inappropriate sexual remarks transmitted through social media, are common among adolescents (Gao, Wu, Wang, Bi, & Du, 2021).

Figure 4. The main structure of "Irreversible" artwork

Figure 5. Participatory elements of the artwork

Based on the notions, students developed their ideation through the context of a spider's web as a metaphor for the Internet. While the object of the spider's web itself was denotatively presented, the context of the Internet's negative impact was connotatively displayed through the artwork. Students aimed to convey their main message related to the danger of the Internet if users use it without caution. They managed to imitate the visual form of a spider's web using black threads and materials to symbolise the dark side of the Internet and aesthetically design the structure of the "dark web" as installation artwork, Figure 4. Students also prepared a set of white golf balls and a black marker in a box next to their web structure. They encouraged the audience to write random words, either positive or negative, on the golf ball and throw them to the web structure, Figure 5. The main purpose was to encourage the audience to participate in the activity and become part of the artwork. The artwork was considered participatory art, since it allowed the audience for her/his creativity to be used in the here and now, just like the students, as artists, use their creativity in preparing the creative moment (Almenberg, 2010). The act of writing and throwing the golf ball to the structure was to imitate the acts of writing comments and throwing it to social media, which later could either encourage positivity or bring harm to the Internet communities. Students would like to remind the audience that once they write or send texts, words, or pictures on the Internet, it would be very hard to take them back. Thus, any actions that we take always have consequences and they will be regrettably irreversible.

Conclusion

Through the project and experiment, we managed to obtain satisfactory outcomes and reflected on the experiment positively. Students enjoyed the whole process of research and implemented their knowledge into their artwork. They were expected to associate and create a mixture of nature and culture while implementing the knowledge collaboratively through practice-based research. The method of participatory art positively supported their methods, strengthened their concept, and conveyed their message directly to the audience. We hope that students will be able to apply their experience in this project to their future research and encourage them to be more confident in implementing their theoretical and practical knowledge.

Acknowledgment

We wish to thank our master students from School of Innovation at Hubei Institute of Fine Arts, China, who participated and shared their insights with us. We also would like to thank our home institutions who supported us during the process of this project and experiment.

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Transformation of the Public Realm in the Context of Regenerative Cities: Case Study of Shared Space Street Design on Campus of University

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ABSTRACT | The current model of urban development with unlimited expansion has resulted in a shortage and uneven distribution of public space, which has become a major challenge for sustainable urban development (Banerjee, 2001; Jacobs, 1961). The concept of regenerative cities has shifted from car-dependent urban planning to a people-oriented urban planning model by adopting an innovative nature-centered approach (Schurig & Turan, 2022). Based on existing urban regeneration research and practice, the incremental transformation of the public realm is recognized as an important strategy that can contribute to sustainable urban development and social inclusion (Nakajima & Murayama, 2024; UrbanNext, 2024).

Shared Space aiming to achieve spatial and democratic quality could be a design approach that triggers a virtuous transformation (Shared Space, 2005). It promotes a more positive public realm through the street layout and design, enhances human interaction and mutual understanding, and shapes a more pleasant and positive public realm (Hamilton-Baillie, 2008; Kaparias & Wang, 2020). This design approach intervenes in the built environment to optimize the connectivity of the traveling environment (Karndacharuk et al., 2014, 2016), which can reduce dependence on the automobile to achieve a regenerative vision.

This study focuses on the effectiveness of paving design for Shared Space to improve automobile-dominated built environments, particularly in university districts and campuses. We selected a campus street as a prototype and proposed 25 pavement design schemes regarding angle, size, color, brightness difference, and material. According to different modes of travel, first-person perspective CG videos were produced at the walking speed of an average adult (about 1.5m/s) and the driving speed allowed in Shared Space (about 20 km/h). Based on this, two experiments were conducted, and the participants were students aged 20-40 from different countries and regions. They were asked to watch the CG videos and fill in the questionnaire (scale) to evaluate all the design schemes.

The study results show that colored non-asphalt pavement designs perform well regarding safety, comfort indicators, and compatibility with the built environment. Its design features are mainly based on the same tone with slight brightness differences, using cobblestone, square bricks, and interlocking blocks as materials. At the same time, pedestrians rated these designs well regarding ease of walking, related to their perceived comfort and priority. In addition, we found significant differences between pedestrians' and drivers' perceptions of the paving designs regarding safety and attractiveness, clarifying that pavement designs of Shared Space positively improve strict functional separation and the built environment of a car-dominated.

It cannot be ignored that appropriate design interventions have been proven through experiments, evaluations, and participant feedback to improve the user experience of the public realm, enhance social interaction and spatial connectivity, and provide people with a safer and more comfortable travel experience. We believe that Shared Space effectively transform the public realm and gradually achieves urban regeneration goals, which offer new ideas for reconciling the past, present, and future while promoting urban resilience and social inclusiveness.

KEYWORDS | Public Realm, Regenerative Vision, Shared Space, Pavement design, Design intervention

1. Introduction

The global trend of urbanization is accelerating, with 68% of the world's population expected to live in cities by 2050 (UN, 2018). Modern urban planning and design are largely car-oriented, with a large amount of urban land occupied by cars (Jacobs, 1961). This trend has not only changed the urban landscape but also fragmented cities into different functional zones, such as residential areas and business districts, by constructing high-rise buildings and wide roads (UrbanNext, 2024). Unsustainable expansion has resulted in a shortage and an inequitable distribution of public spaces (Banerjee, 2001; Jacobs, 1961), compelling us to reconsider urban design principles (Schurig & Turan, 2022).

In the face of these challenges, the key to urban transformation does not rely on new technologies but on renewing the streets (Sadik-Khan & Solomonow, 2016). Streets not only transportation but also physical activities, relieve stress and enhance their well-being (Khateeb & Shawket, 2022). However, the segregation of transport infrastructure has weakened the social function of streets, making it challenging for them to provide high-quality public spaces. 'An attractive and accessible street will stimulate people to walk and cycle to their destinations, reducing vehicle traffic and pollution' (Anvari, 2014; DfT, 2007). To improve public life on streets, many countries have implemented regulations to reduce traffic volume and speed, thereby integrating the Shared Space concept into urban street planning (Hamilton-Baillie, 2008; Furchtlehner, 2019). Shared Space has been shown to increase interaction between traffic participants by replacing traditional traffic signs and elements with informal social rules (Clarke et al., 2006; Methorst, 2007), while utilizing a well-defined street layout and facilities to guide road user behavior (Batista, 2022; Shared Space, 2005, 2008).

Previous studies have also shown that Shared Spaces can provide an effective compromise for transport participants (Batista, 2022; Methorst, 2007). By optimizing street layout and facilities, the dominance of motor vehicles is reduced, thereby improving the comfort and experience of pedestrians (Kaparias et al., 2012; Kaparias & Wang, 2020). It has also been confirmed by other research that the paving design of Shared Space also has a significant impact on driver perception, mainly in the form of reduced driving speeds. However, the effect of pavement design on pedestrian perception and walking behavior has not been fully studied. In addition, the application and study of Shared Space in university districts or campuses remain limited. Therefore, this study explores the effect of Shared Space paving design on improving the car-oriented built environment, especially interventions involving university districts and campus environments. We evaluated different kinds of paving design schemes through experiments and investigated and analyzed the perceptions of pedestrians and drivers to verify the impact of paving design on walking behavior and its role in promoting the vitality of public spaces.

2. Literature review

2.1. Regeneration of the public realm

Cities have undergone numerous significant structural changes, and their complexity and dynamism reflect the many processes of physical, social, environmental, and economic transformation (Roberts & Sykes, 2000). In the early 1960s, the concept of urban public space was cited by scholars such as Lewis Mumford and Jane Jacobs (Nadal, 2000). They criticized large-scale renovation plans from different perspectives and advocated for small and flexible plans.

In the 1970s and 1980s, urban planners, researchers, and government entities began to explore innovative approaches to creating urban space. Small-scale

and incremental ‘neighborhood renewal’ gradually replaced large-scale and radical redevelopment. In 1974, the local government of Rotterdam launched the ‘Building for the Neighborhood’ (bouwen voor de buurt) program aimed to renovate and upgrade the old city. This initiative led to the development of increasingly well-designed residential areas, giving the old city a new look and providing a successful example of urban regeneration and revitalization for many European countries (Ariënne & Paul, 2014; Van Melik & Lawton, 2011). In 1982, Spanish architect Manuel de Sola Morales proposed small-scale interventions in run-down areas of Barcelona. This approach, known as ‘urban acupuncture’, has since become a model for sustainable urban transformation by triggering local improvements to promote overall urban development (Hemingway & Alejandro, 2022).

Entering the 1990s, reshaping the urban public realm became an integral part of many urban renewal strategies. It was recognized to improve the living environment, enhance the city's image, and improve the quality of life for city residents. In 1999, the British report ‘Towards Urban Regeneration’ clearly proposed that urban design centered on public space is a ‘dynamic development strategy,’ which was subsequently implemented in the urban regeneration process of London. Since then, the British government has increased its investment in traffic improvements, shared streets, pedestrianization, and urban landscapes, thereby significantly improving the quality of urban public spaces (Yang, Z., & Yu, D. Y., 2018). Barcelona, a paradigm of urban renewal, initiated the Superblock renovation and renewal plan in 2015 to address issues such as the excessive occupation of urban street space by motor vehicles and the diminished vitality of street space. The optimized road network has been transformed into three types of road space, including shared streets featuring a curb-less design (Muzzini, & Torres, 2023).

2.2. Research on Shared Space

In the late 1960s, the Delft Planning Department conducted pioneering experiments based on the ‘Woonerf’ concept. These experiments involved removing standardized traffic control elements such as signs, markings, and curbs, thereby integrating traffic flow with residential activities to enhance the vitality of public space (Karndacharuk et al., 2014). In 1976, the success of the ‘Woonerf’ led the Dutch government to officially introduce corresponding guidelines and regulations, which influenced the design of residential streets in the UK, Switzerland, Denmark, and Germany. Subsequently, the application of mixed traffic modes in non-residential areas has increased, evolving into the ‘Shared Space’ concept, which was actively promoted by Dutch traffic engineer Hans Monderman (Hamilton-Baillie, 2004). Hans Monderman's practices have not only achieved remarkable success but also garnered significant attention from the international community and academia (Ben-Joseph, 1995; Clarke et al., 2006; Hamilton-Baillie, 2008). The concept of Shared Space was subsequently incorporated into the ‘Interreg IIIB North Sea’ (2000-2006), leading to the implementation of pilot projects in Belgium, Denmark, Germany, the Netherlands, and the UK (Karndacharuk et al., 2014; Shared Space, 2005, 2008).

In the 2000s, Shared Spaces were applied to many urban streets in the UK, with the redesigned Exhibition Road in London being one of the most well-known projects (Batista, 2022; Jayakody et al., 2018). Several studies have examined the transformed Exhibition Road in London, revealing that streets with Shared Space elements significantly enhance the pedestrian experience by increasing their confidence (Kaparias et al., 2012; Karndacharuk et al., 2013; Kaparias et al., 2020; Ruiz-Apilanez et al., 2017). In particular, designing a level surface without obstacles facilitates unimpeded movement for pedestrians (Jayakody et al., 2018; Karndacharuk et al., 2016; Ruiz-Apilanez et al., 2017). Additionally, streets with Shared Space elements help to increase eye contact between pedestrians and drivers, thereby influencing driving behavior (Toyoshige, et al., 2011; Yoshiki & Hashimoto, 2014). Paving designs contribute to the creation of a low-speed traffic environment, and white diagonal interlocking block pavements have been shown to have a significant impact on driving speed (Ozaki et al., 2017). Therefore, some researchers argue that the 'Shared Space' concept offers a viable compromise. The integrated traffic space increases social interaction and reflects equal road rights (Kaparias et al., 2023; Methorst, 2007), while a well-designed street layout along with appropriate street facilities can substantially enhance public space safety, accessibility, and overall spatial quality (Batista, 2022; Kaparias & Wang, 2020, 2016; Shared Space, 2005, 2008).

Most practical and theoretical research on Shared Spaces has focused on residential areas and commercial streets. Limited studies have examined the implementation of Shared Space in university districts and campuses, with notable examples including Skvallertorget Square in Norrköping, Sweden, the Sonnenfelsplatz intersection in Graz, Austria, the Adelphi quarter at the university of central Lancashire in Preston, UK, and the Rengerslaan around NHL Stenden University in Leeuwarden, the Netherlands. Against the backdrop of accelerated social development, universities have become integral components of urban landscapes as cultural centers or in conjunction with science and technology centers, engaging them in wider discussions and urban regeneration practices (Melhuish, 2015). As cities around the world have experienced a 'flurry of [HE] building activity in cities around the world' (Van Heur, 2010). It is necessary to pay more attention to the revitalization of university districts and the built environment of campuses to gain experience to shape a new urban future.

3. Methodology

3.1. Prototyping

This study selected a six-meter-wide two-way street within the university district of Fuzhou, China, as a prototype, as shown in Figure 1(a). Following the principles of Shared Space, we developed a 3D model by using SketchUp Pro (2020 version). In this virtual street environment, there is no physical separation between pedestrians and motor vehicles, i.e., no curbs, road signs, or dedicated lanes for

specific modes of transportation. The CG videos are generated from a first-person perspective and played at both the walking speed of an average adult (about 1.5 m/s) and the permitted driving speed in Shared Space (about 20 km/h). The experimental stimuli comprised 25 different paving designs that were applied to the level surface of the prototype street. To align with the landscape and functional requirements, permeable pavement materials commonly used in Shared Space projects were employed, including interlocking blocks, cobblestones, concrete, and square bricks. Considering the natural properties of these materials and their compatibility with the built environment, the study utilized red, yellow, and blue from the Munsell system as primary colors. In addition, parameters such as pavement width, angle, brightness difference, and size were carefully considered to ensure the rationality and validity of the experiment.

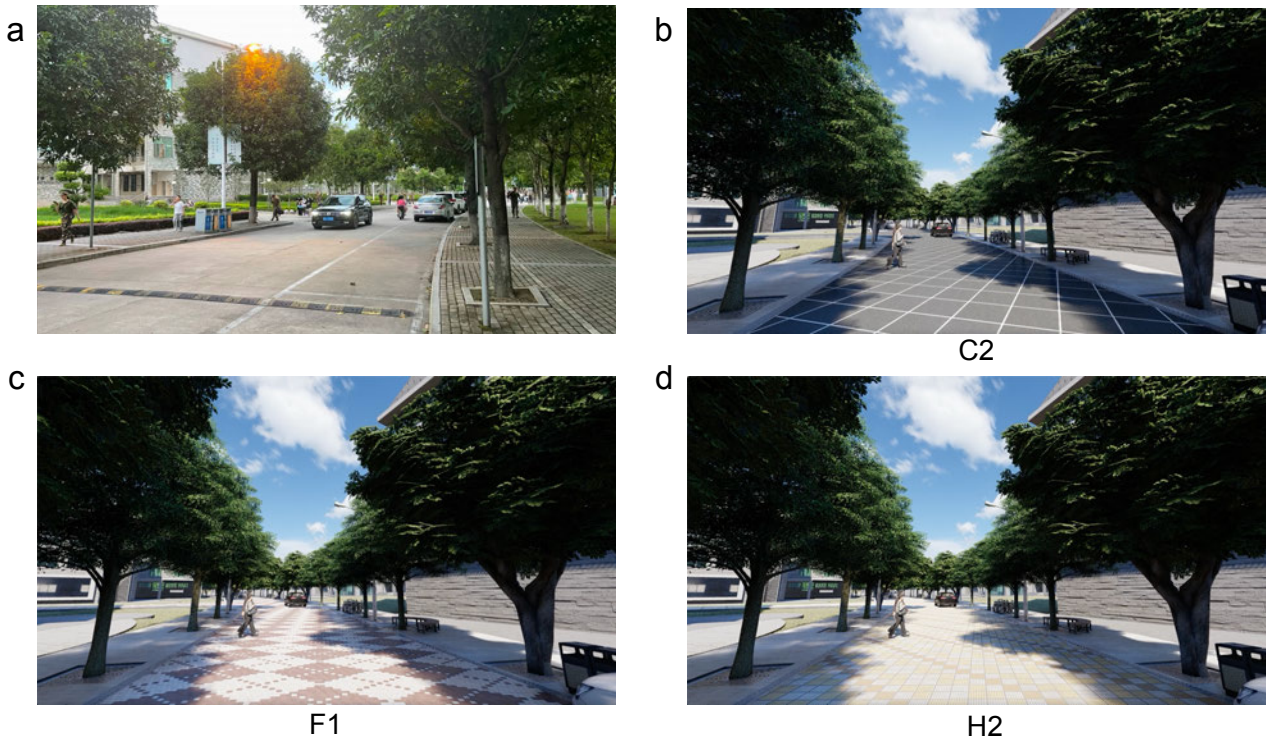

Figure 1. Prototype street and pavement design schemes used for the experiments. (a) The campus street of Fujian Jiangxia University, China. (b) The Interlocking block pavement design. (c) The cobblestone pavement design. (d) The Square brick pavement design.

It is important to note that the campus street used as a prototype serves pedestrians, drivers, and some cyclists in actual circumstances; however, cyclists were not included in the evaluation scope of this study. Cycling experiences involve numerous physical factors, particularly higher vibration levels than driving and walking, which cannot be accurately replicated through visual simulation alone. Given that the study focuses on investigating users' perceptions of pavement design in visual terms, the user group was restricted to pedestrians and drivers to ensure the validity of experimental results.

3.2. Experimental design

Stimuli were evaluated using a 7-point Likert scale, where 1 represented the most negative and 7 represented the most positive response. By reviewing relevant

research and audit tools, we identified 19 adjective pairs serving as indicators for the pedestrian experiment. Among them, 14 adjective pairs were used to evaluate the overall impression of the built environment, such as safe-dangerous, comfortable-uncomfortable, attractive-unattractive, aesthetic-nonaesthetic, neat-messy, compatible-incompatible, etc. Moreover, 5 adjective pairs were introduced to evaluate Shared Space, such as easy eye contact-difficult eye contact, with priority-without priority, easy walking-difficult walking, etc. Meanwhile, the scale and questions employed in the driver experiment were slightly modified from those used in the pedestrian experiment to investigate driving behavior in Shared Space. To facilitate comprehension and minimize potential biases and misunderstandings, the questionnaire was provided in English and Japanese, and each adjective pair was explained verbally before the stimulus was evaluated. For example, in the evaluation indicator “Safety-dangerous”, 1 point was interpreted as extremely dangerous and 7 points as extremely safe.

Furthermore, considering the primary user groups for the prototype, we recruited 109 students from various countries and regions at the University of Tsukuba to participate in our experiments. Participants were aged between 20 and 40, with 56% male and 44% female. The pedestrian experiment (n=54) consisted of 18 Japanese students, 19 Chinese students, and 17 Non-Asian students. The driver experiment (n=55), which included 19 Japanese students, 20 Chinese students, and 16 Non-Asian students.

3.3 Procedure

The two experiments were conducted separately in a controlled laboratory setting at the University of Tsukuba, with the following procedures. First, we provided participants with detailed explanations regarding the experiment's purpose, procedure, method, and the background of the Shared Space concept. After obtaining the participants' permission, the experiment commenced.

- The total experience time for each participant was 1 hour.
- The CG videos viewed by each participant were played in a random order.
- Participants were asked to watch the CG videos while walking as pedestrians and sitting in a chair as drivers.
- The duration of each CG video for the pedestrian was 30 seconds; the duration of each CG video for the driver was 1 minute.
- Allowed to stop when participants felt tired and take a 5-minute break before continuing.
- Participants were asked to complete questionnaires evaluating each stimulus.

Finally, we conducted brief interviews with each participant to collect more detailed feedback on the design schemes, which will serve as a reference for future optimization of the paving design.

4. Results and Discussion

4.1. Perceptual analysis of pedestrians

Micro-level urban design qualities and improvements to the street environment can provide a more pleasant and comfortable experience (Cambra, P et al., 2022). To create a more pleasant, comfortable, and inclusive travel environment, this section presents the perceived impact of Shared Space paving designs on pedestrian comfort and compatibility.

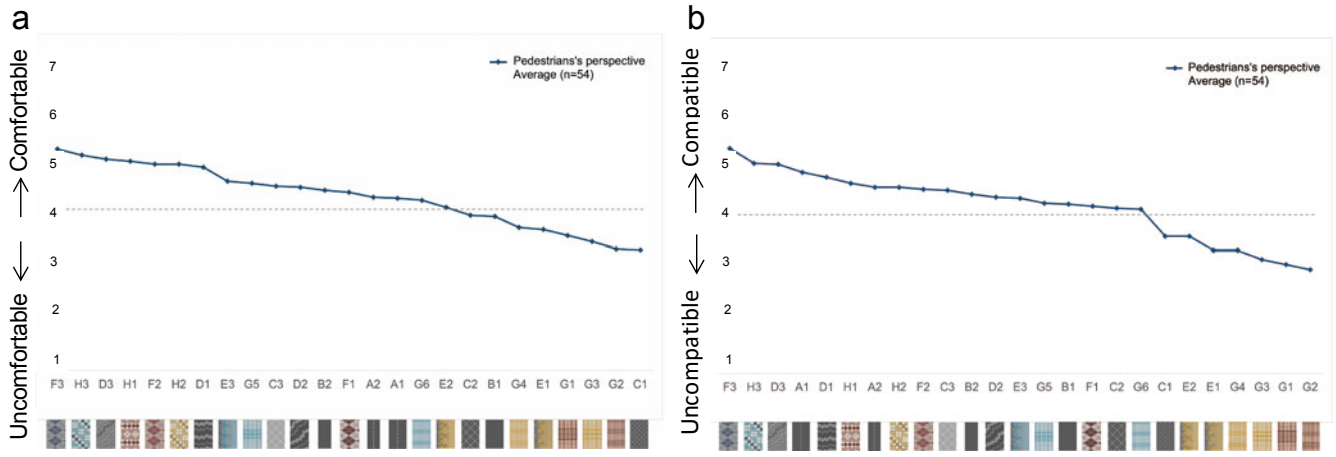

Figure 2. (a) The perceived comfort of pedestrians. (b) The perceived compatibility of pedestrians.

Figure 2(a) shows the scores for each pavement design in terms of perceived pedestrian comfort. Designs such as the blue cobblestone design (F3) and the blue square brick design (H3) scored 5.07 and 5.00, respectively, indicating that these designs make pedestrians feel a high level of comfort. The grey interlocking block design (D3), the red square brick design (H3), and the red cobblestone design (F2) also received high ratings from pedestrians, adding to the comfort of the travel environment. The blue concrete design (G5), the dark grey interlocking blocks with a 45-degree lines (D2), and dark red cobblestone design (F1), etc., scored between 4.00 and 5.00, which means that pedestrians' evaluation of their comfort was more positive. However, the asphalt paver with diagonal lines design (C1) and the red concrete design (G2) received lower scores of 3.22 and 3.24, indicating that these designs make pedestrians feel uncomfortable.

Figure 2(b) shows the scores of each pavement design in terms of pedestrian perceived compatibility. The blue cobblestone design (F3) and the blue square brick design (H3) scored 5.17 and 4.89, respectively, indicating that pedestrians perceive these designs as highly integrated with the built environment. It is worth noting that, unlike the comfort evaluation, the 6-meter asphalt paver with a central line (A1), and the 4-meter asphalt paver (A2) received more positive evaluations from pedestrians. Second, the asphalt with diagonal lines design (C3), the interlocking blocks with a 45-degree lines (D2), etc., scored 4.40 and 4.30, respectively, indicating that the pedestrians perceived the comfort level as average. In contrast, the red concrete design (G2) and (G1) scored 2.93 and 3.02, respectively, with lower scores indicating that these designs are incongruous with the street environment.

The above results show that color, material, and brightness design parameters play an important role in improving pedestrian walking comfort. These design parameters also affect the perception of the integration of the design with the built environment. In addition, the results of the correlation analysis show the intrinsic links between each evaluation indicator. Specifically, there is a positive correlation between walking ease and comfort (r= 0.9238, p<0.001), as shown in Figure 3(a). It shows that, to some extent, increasing pedestrian perceived comfort may help improve their perception of the walking ease of the built environment. It is also worth noting that there is a positive correlation between attractiveness and priority (r=0.9105, p<0.001), as shown in Figure 3(b). This suggests that, to some extent, improving pedestrian attractiveness can help improve their perception of the walkability of the built environment. These statistically significant correlations provide data support for this study.

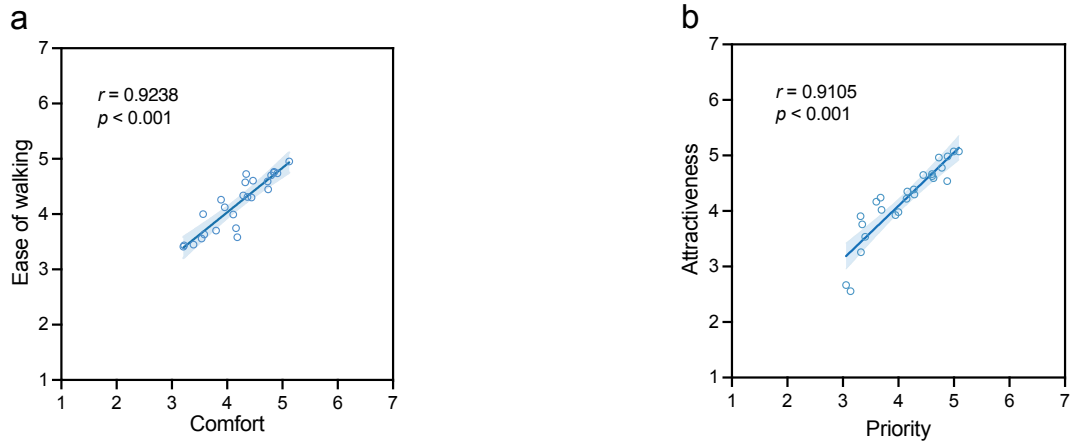

Figure 3. (a) The correlation between ease of walking and comfort. (b) The correlation between attractiveness and priority.

4.2. Perceptual analysis of drivers

To ensure a comfortable experience for pedestrians in Shared Space, this study also investigated the impact of 25 different pavement designs on driver perception, particularly driving speed.

The scores of driving speed for each pavement design are shown in Figure 4(a). The 6-meter-wide asphalt with a central line (A1) and the 4-meter-wide asphalt pavement (A2) received the highest ratings from drivers, at 5.22 and 4.67, respectively. This indicates that drivers considered these designs suitable for high-speed driving. Designs ranging from the 6-meter asphalt design without a white center line (B1) to the blue concrete design (G6) received ratings between 4.00 and 3.00, suggesting these designs had a slight influence on driving speed. In contrast, the red square brick design (H1) and the red cobblestone design (F2) received lower scores of 2.42 and 2.62, indicating that these designs attracted drivers' attention and prompted them to voluntarily reduce their speed. Notably, although the red concrete design (G2) received the lowest ratings, at 2.40. This design was perceived by pedestrians as uncomfortable and incompatible, which similarly affects drivers' perception, resulting in lower speeds. Furthermore, the results of the correlation analysis revealed there was a positive correlation between driving speed and ease of driving (r = 0.7137, p < 0.001), as shown in

Figure 4(b). This suggests that influencing drivers' driving speed may help alter their behavior in Shared Space.

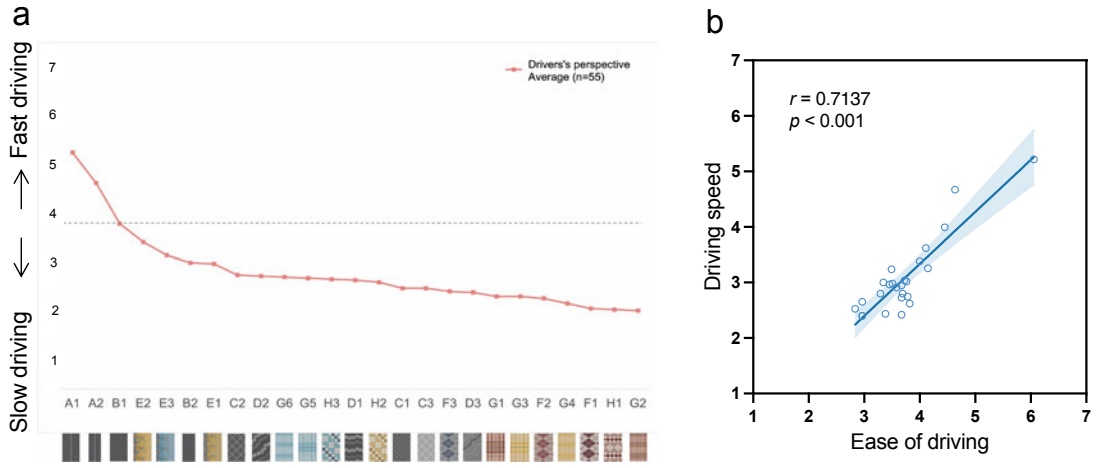

Figure 4. (a) The perceived driving speed of drivers. (b) The correlation between driving speed and ease of driving.

4.3. Perceptual analysis between pedestrians and drivers

The physical characteristics of the street environment directly affect the safety, comfort, and attractiveness of pedestrians (Saelens & Handy, 2008), pedestrian attractiveness and safety should be given priority in the practice of people-oriented public realm renewal (Basu et al., 2022). Therefore, in addition to understanding the impact of pavement design on pedestrian comfort and its compatibility with the built environment, it is also important to understand the perceptions of safety and attractiveness of different traffic participants. This section presents the perceptions of safety and attractiveness from the perspectives of both pedestrians and drivers.

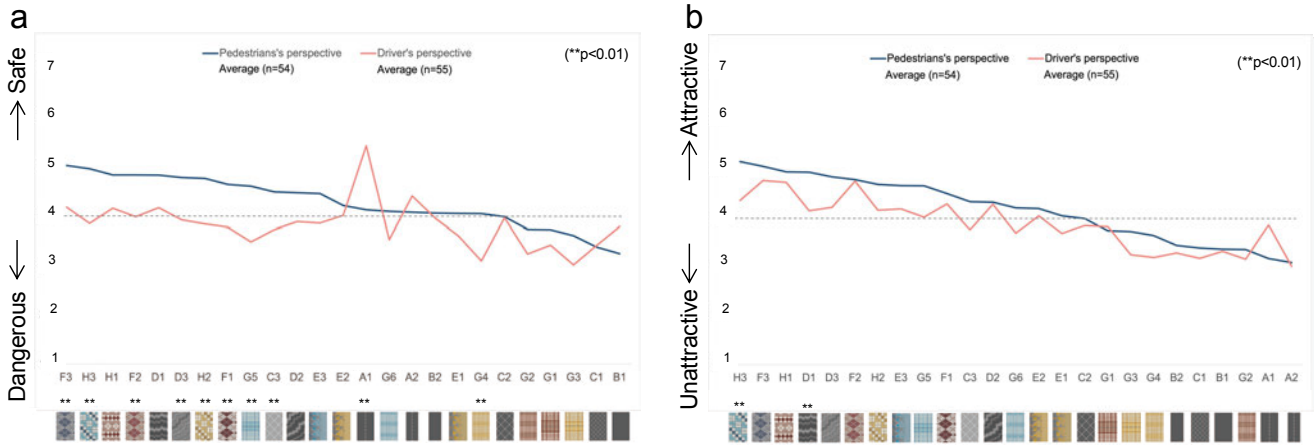

Figure 5. (a) The comparison of the safety for pedestrians and drivers.(b) The comparison of the attractiveness for pedestrians and drivers

Figure 5(a) shows the perceived safety scores of pedestrians and drivers for different stimuli. Pedestrians rated the blue cobblestone design (F3) as the highest, scoring at 5.00. Moreover, the blue square brick design (H3) and the red square brick design (H1), and the red cobblestone design (F2) also received high scores. However, the 6-meter asphalt design without a white center line (B1) scored the lowest at 3.22, followed by the asphalt paver with diagonal lines design (C1). On the other hand, drivers considered the 6-meter asphalt paver with a

central line (A1) to be better than the other designs, scoring at 5.38, while both the large yellow concrete design (G3) and the small yellow concrete design (G4) were rated the lowest, around 3.00.

The statistical analysis further revealed significant differences in the perceived safety between pedestrians and drivers. Specifically, the 6-meter asphalt paver with a central line (A1) scored the greatest difference ($p<0.01$). Additionally, designs with slight differences in brightness, including the blue square brick design (H3), red cobblestone design (F2), blue cobblestone design (F3), and the grey interlocking block design (D3), also scored relatively high ($p<0.01$). These findings suggest that these paving designs can improve the perception of safety for pedestrians compared to traditional asphalt pavements while also influencing drivers' perception of risk.

Figure 5(b) shows the perceived attractiveness scores of different stimuli for both pedestrians and drivers. The blue square brick design (H3) achieved a score of 5.11, while the blue cobblestone design (F3) and red square brick design (H1) also received high scores. However, the 4-meter asphalt paver with central lines (A2) received the lowest score at 3.10, followed closely by the 6-meter asphalt paver with a central line (A1). From the drivers' perspective, the red square brick design (H1) and red, blue cobblestone design (F2 and F3) were rated significantly higher compared to other designs, scoring at 4.73 and 4.67, respectively. In contrast, the red concrete design (G2), the asphalt paver with diagonal lines (C1), and the 4-meter asphalt paver (A2) performed the worst.

The statistical analysis further revealed significant differences in the perceived attractiveness between pedestrians and drivers. Specifically, the difference in ratings between the blue square brick design (H3) and the grey interlocking block design (D3), with slight differences in brightness, was statistically significant ($p<0.01$). Moreover, there was also a difference in ratings between the two for the 6-meter asphalt paver with a central line (A1) down the middle, but it was not statistically significant. Overall, the differences in the attractiveness ratings of the same paving designs for pedestrians and drivers are generally small. For example, red cobblestones design (F2) and red square bricks design (H1) are highly rated by both groups, indicating that these paving designs can achieve a relative balance between the walking and driving environments.

4.4. Discussion

The research results show that the paving design of Shared Space can effectively improve the car-oriented built environment and promote the vitality of urban public spaces by creating a safe, comfortable, and attractive travel environment. The following is a specific discussion of the experimental results.

The results of the pedestrian experiment show that colored non-asphalt pavement designs, represented by blue cobblestone design (F3), blue square

brick design (H3), and red square brick design (H1), provide a safe, comfortable, and non-intrusive travel environment for pedestrians. However, warm-toned concrete design (G2) and (G3) scored lower across multiple dimensions, indicating that these designs fail to enhance street space quality and walking attractiveness. In contrast, traditional asphalt pavement (A1) and (A2), etc., performed well in terms of street space quality but poorly in walkability and visual appeal, indicating that they were difficult to meet the needs of pedestrian activities in mixed traffic environments. In addition, the asphalt with diagonal lines (C1) and (C2) also scored low across multiple dimensions and did not provide an optimal travel environment for pedestrians. These findings suggest that rich visual effects created through color and material play a crucial role in mixed-traffic street environments, thereby enhancing pedestrians' sense of safety and walking experience (Chen & Yamamoto, 2024; Parkin & Smithies, 2012; Ruiz-Apilánez et al., 2017).

On the other hand, driver experiment results also confirmed that colored non-asphalt pavement designs affect drivers' perceptions, primarily manifested as reduced driving speeds. This finding supports previous studies, which indicated that non-asphalt pavement designs make it difficult for drivers to distinguish between sidewalks and lanes, leading them to perceive the environment as more “dangerous,” “uncomfortable,” and “interesting” (Ozaki et al., 2017; Yamamoto et al., 2024). Additionally, compared to red cobblestone design (F2) and red square bricks (H1), red concrete design (G2) and yellow concrete design (G4) also resulted in a significant reduction in driving speed, which may be attributed to increased visual complexity and reduced spatial clarity. However, warm-toned concrete designs also exhibit issues related to poor comfort and safety, which may lead to excessive deceleration by drivers, thereby negatively impacting traffic flow efficiency.

The study also compared the perceptions of pedestrians and drivers on the pavement design of Shared Space and found differences in their perceptions of safety and attractiveness. In terms of safety, pedestrians and drivers had very different opinions about the 6-metre-wide asphalt with a central white line (A1) and the non-asphalt pavement designs, such as the blue cobblestones design (F3) and the red square bricks design (H1). Pedestrians tended to perceive non-asphalt pavement designs as offering higher safety, while drivers perceived these designs as less safe, possibly because the visual complexity of the non-asphalt paving designs made it difficult to predict the safety of the road. Regarding attractiveness, pedestrians and drivers gave similar ratings to most pavement designs, with only a few designs showing differences in perception. This consistency is encouraging for the concept of Shared Spaces. Place identity is enhanced through colored non-asphalt pavement designs, which not only arouse drivers' attention and vigilance, but also create a unique sense of place to attract more people to participate in public spaces (Batista, 2022; Karndacharuk et al., 2013), thus strengthening social interaction and mutual understanding (Hamilton-Baillie, 2008).

Take it together, colored non-asphalt pavement designs play an important role in balancing and regulating the behavior of traffic participants. The main features of these designs are using materials with rich textures, such as cobblestones, square bricks, and interlocking blocks, followed by the same tones and slightly different brightness, as shown in Figure 5. In addition to great permeability, such pavement designs have improved thermal comfort conditions in outdoor urban spaces, particularly the cobblestone made from natural granite (Faragallah & Ragheb, 2022). Furthermore, light-colored pavements are more effective than dark asphalt pavements in reducing surface temperature increases due to their higher solar reflectivity (Doulos et al., 2004; Senevirathne et al., 2021). Although this study has not yet conducted a quantitative assessment of the thermal performance of colored non-asphalt paving designs, existing research findings support their potential application in mitigating the urban heat island effect. This provides directional insights for street space design and optimization under urban regeneration strategies.

Therefore, this can be used as an effective strategy to optimize Shared Spaces to enhance pedestrian comfort, improve environmental recognition, and promote inclusivity and sustainability in the public realm. However, asphalt designs fail to improve the perceived safety and comfort of pedestrians in Shared Spaces and lack visual appeal. That means they do not provide an inclusive environment for different traffic participants and are therefore not appropriate for Shared Spaces or similar mixed traffic systems. These findings provide theoretical support and design suggestions for optimizing mixed traffic systems like Shared Space, thereby demonstrating that Shared Spaces are crucial for promoting the vitality of the public realm and serve as a model for creating sustainable cities (Jayakody et al., 2018; Talen, 1999).

Figure 6. (a) The cobblestone pavement design. (b) The square brick pavement design.

5. Conclusion

This study systematically assessed the impact of Shared Space paving designs on pedestrian perception and confirmed the significant positive effect of colored non-asphalt paving designs in enhancing walkability in mixed traffic systems. Furthermore, the essential characteristics of safe and aesthetically pleasing non-asphalt pavement designs were identified by comparing the perceptions of

pedestrians and drivers. These characteristics not only enhance the safety and comfort of the walking environment but also improve the spatial quality and visual appeal, creating a sense of place that is different from traditional roads. A sense of place encourages people to engage with public spaces and promotes social interaction, thereby effectively improving the strictly functionally segregated, car-oriented built environment. Moreover, our findings provide empirical support for regenerating public spaces in university districts and campuses. By investigating the perceptions of specific user groups, it is demonstrated that design interventions can be made more inclusive, thereby improving user experience and well-being. Due to the limitations of the experimental method, the perceptions of cyclists have not been investigated, which would be an important direction for future research. In addition, we will further explore the mechanisms by which Shared Space paving design parameters influence the perceptions and behaviors of transport participants. This will provide urban designers and policymakers with more actionable and evidence-based design guidelines, ultimately contributing to more vibrant, inclusive, and sustainable urban renewal.

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ethical leadership
a new frontier for design

Co-creative park design: Sustainable and participatory concepts for urban green spaces

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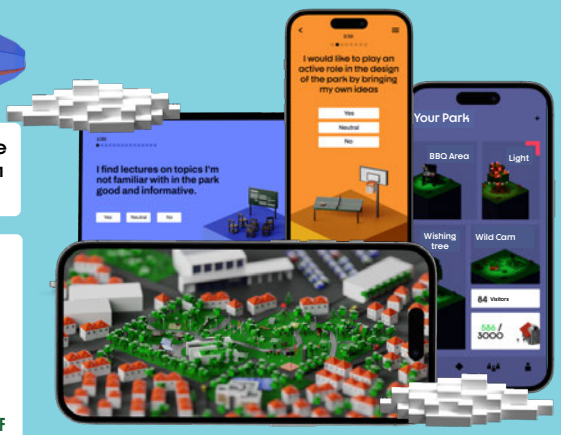
YOUR PARK

Multiple user surveys ensure maximum compliance with the interests of residents.



ABSTRACT

The project investigates co-creative design processes to promote regenerative urban development. It brings people together to engage and communicate on public/community issues. The interactive concept for redesigning urban green spaces demonstrates how design can successfully combine citizen dreams, technology and ecological responsability. The example of an interactive concept for redesigning urban green spaces shows how design can combine technology and ecological responsibility.

RESEARCH OBJECTIVES

- **Promoting regenerative urban development:** Researching approaches to restore ecological systems in urban areas.
- **Rethink human-nature interactions:** Exploring strategies which create benefits for both: ecosystem and urban living
- **Advancing multidisciplinarity in design:** Integrating insights from ecology, social sciences and technology.
- **Strengthen citizen participation:** Development of tools and methods that enable people to actively contribute to urban planning.

Regenerative urban development e.g. tranforming motion energy to electric

METHOLOGY AND TOOLS

- **Participatory design approach:** Use of surveys, environmental studies, workshops and interactive tools (e.g. park configurator) to collect and prioritize citizens' ideas and wishes.
- **3D visualization and app development:** Creation of digital simulations to illustrate design options.
- **Iterative co-design processes:** Iterations between citizen feedback and expert assessments to improve proposals.

Graphics balance concrete and abstract with a generic style, avoiding polarizing details to enhance creative co-design.

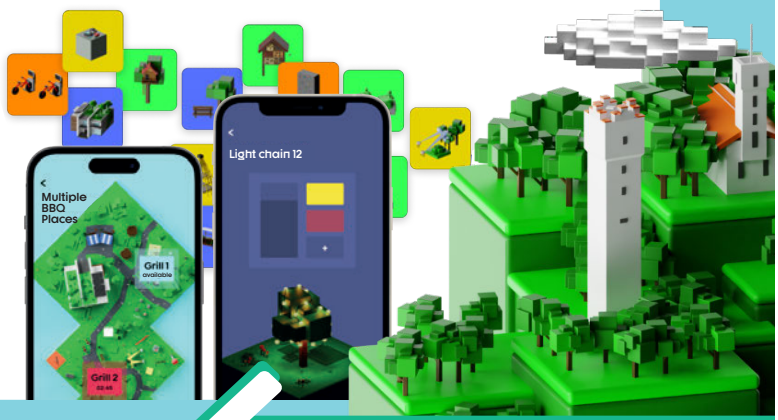
EXPECTED/OBTAINED RESULTS

- Development of a modifiable, generic model for regenerative urban parks.
- Improving ecological diversity in urban spaces.
- Increase social engagement and environmental awareness of citizens.
- Creating a replicable framework for other cities
- Creating identity, social cohesion through participation, well-being because participation, responsible use of facilities

RESEARCH PROCESS

- **Problem definition:** Identification of urban challenges through interviews with citizens and stakeholders (e.g. city administrations).
- **Tool development:** Design of an interactive configurator that gives citizens the opportunity to virtually design park and urban spaces.
- **Workshops and tests:** Implementation of workshops to evaluate and adapt the tools based on real feedback.
- **Analysis phase:** Evaluation of collected data, weighting of proposals and transfer into concrete design concepts.
- **Implementation:** Proposals are implemented in cooperation with city administrations and ecologists.

Case Video



Regenerative City and Territorial Development

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Urban-Rural Interconnected Development: Regional Models of Social Innovation Design Practice

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ABSTRACT | Urban–rural integration and coordinated development play an important role in mitigating imbalances in the mobility of resources between urban and rural areas. (Woods, 2007; Bedini and Bronzini, 2016; Yan J. etal. 2018). The process of social innovation is the formation of collaborative organizations through the interaction and cooperation of different entities. Its cooperative attributes and interactivity make it possible to promote urban-rural integration. Therefore, taking the development of urban-rural linkages as the goal of social innovation design, the existing internal and external resources can be creatively restructured (Manzini, 2014), and internal momentum can be stimulated through internal and external cooperation to achieve the development goal of urban-rural linkages.

This paper illustrates the specific role of social innovation design in urban-rural integration to the design audience: make the connection happen, inducing resource reorganization, and promoting systemic circulation.Through three typical case studies from China, we identified three basic models of social innovation design to promote urban-rural connectivity (industry, culture, ecology) and their corresponding integration paths of 'Finding connection by design, maintaining connection dynamics in design, and strength of connection by design'.Sustainable development between regions is promoted by shaping connections in the three dimensions of production-life-ecology.

As these case studies show, using social innovation design as a key leverage point for

connecting urban and rural areas can help us rethink sustainable development in urban and rural areas and re-examine the interactions between isolated elements and complex systems. At the same time, urban-rural integration expands the application space for social innovation design, offering a broader and more practical context for design to engage deeply in social development, also coaching us (as designers) to think in a more long-term and systemic way about the significance of innovation projects in regional development.

KEYWORDS | Urban-rural development, Social innovation design, Sustainable development, Design practice, Urban-rural interconnection

1. Introduction

In 1950, the world was predominantly rural, as global urbanization level was 30%. By 2050, the scenario is projected to reverse, as urbanization level is expected to reach 70% (UN 2018). While this has helped to promote industrial agglomeration and economic growth, rapid urbanization has led to a widening urban–rural gap and factor mobility imbalances (Jiang and Xie, 2024). In some developing countries, the urban–rural dichotomy is evident in the simultaneous expansion of urban industries and the decline of rural agriculture, leading to a persistent, unidirectional flow of resources toward urban and posing challenges to sustainable socioeconomic development (Guo and Liu, 2019; Ravallion and Chen, 2007). In this context, the interaction between urban and rural areas requires a dynamic and systematic reevaluation, with urban–rural integrated development emerging as a potential strategy to address the growing disparity. Social Innovation, as a way of reorganizing resources and restructuring social relations (The Young Foundation), may become an effective new idea in the study of urban-rural integration development. This integration also expands the scope of social innovation design, creating broader opportunities for design to engage deeply in social development. In this paper, we introduce the functionality of social innovation in the process of urban-rural development to the design audience through the practice of social innovation design, illustrating how design practices can actively contribute to the process of urban–rural integration. The first part of this paper outlines the research question by examining urban-rural integration and social innovation design. The second part presents three representative case studies, emphasizing the design patterns and pathways highlighted within these examples. The third part, based on the synthesis of multiple case studies, investigates the potential of design to foster sustainable regional development by shaping industry-culture-environment connections. Additionally, evaluating the effectiveness of social innovation design across different dimensions may lead to divergent conclusions. In the discussion section, we address this situation through an objective assessment, analyzing the limitations of the examples and proposing directions for future research. The contribution ends with conclusions that summarize what is previously stated.

1.1. Social Innovation and Social Innovation Design

The practice of social innovation is highly localized. When existing structures and policies can no longer solve some of the most pressing problems we currently face, social innovation is born to address complex issues and become the focus of attention. Projects are initiated through voluntary cooperation and interaction between local residents and stakeholder groups to propose practical solutions. These solutions challenge traditional mainstream models and break through traditional oppositions between public and private, local and external, consumption and production, needs and desires (Manzini, 2014), thereby creating new social relationships or modes of cooperation. In other words, these innovations are not only beneficial to society, but also enhance the driving force for social change.

In the 21st century, social innovation and design activities are closely intertwined, with social innovation acting as both the driving force and the objective of design efforts. Social innovation design necessitates the development of a new framework for understanding the impact and role of design in human society. Ezio Manzini defines social innovation design as 'all activities that professional design can carry out in order to activate, maintain and guide society towards sustainable development.' As highlighted in this definition, social innovation design is a vast field that emerges from the intersection of various social innovation phenomena and contemporary professional design practices (Brown and Wyatt, 2010; Tang, 2017). The process of social innovation design involves a socio-technical transformation driven by societal change, aiming for social transformation. "Make things happen, listen to feedback, and guide action" is the role of the design community in the process of social innovation design (Manzini, 2016). Designers play the role of insight providers in the early stages and of guides during the project.

1.2. Social innovation design and urban-rural integration

Urban-rural integration development refers to the bidirectional flow of factors between urban and rural areas, encompassing the organic integration and coordinated development of resources, population, industry, society, and other aspects. Research on urban-rural integrated development has gone through an evolutionary process from theoretical exploration to mechanism analysis. Early theories, such as Howard's (1898) concept of the "idyllic city," emphasized the complementary advantages of urban and rural areas. This idea was further developed through Geddes' (1915) "regional planning" and Mumford's (1961) theory of decentralized urban layouts. Building on these foundations, urban–rural relationships have shifted from simple, unidirectional exchanges to dynamic and increasingly complex networks of interdependence (Davoudi and Stead, 2002). Contemporary research primarily focuses on three aspects. First are spatial action mechanisms, encompassing urban-led regional restructuring (Mason, 2011), rural functional transformation (Andersson, 2012), and the strategic role of urban–rural junction zones (Peng et al. 2022). Second are factor mobility mechanisms, including cross-domain interactions involving population (Nilsson, 2014), industry (Mitchell, 2013), and land use (Lu et al. 2019). Third are frameworks for sustainable development, with global initiatives such as the UN's SDG 11 and the New Urban Agenda (2016) promoting inclusive, smart, and resilient urban–rural models (Gupta et al. 2015; Sharifi, 2019). Current research trends, on the other hand, show a more humanistic approach. Nevertheless, existing international literature on urban–rural relations remain largely concentrated at the macro level, focusing on policy coordination (Ganning, 2013), territorial planning, spatial pattern analysis, and meso-level ecological networks. In contrast, limited attention has been paid to the role of the design discipline in advancing integrated urban–rural development.

The connection between urban and rural areas relies on 'something happening' to drive integration, with social innovation design serving as a key leverage point for fostering urban-rural connectivity. The establishment of the project is facilitated through the interaction and cooperation of different entities, which promotes the reorganization of resources and the occurrence of connections, and consolidates the connections through continuous updating and improvement (Thorpe and Manzini, 2018). In this process, the collaborative nature and sustainability of social innovation design align with the overarching goal of urban-rural integration. Therefore, the goal of social innovation design is rooted in urban-rural integration, positioning it as an effective tool for narrowing the urban-rural gap and offering a tangible pathway to achieve this integration. Simultaneously, urban-rural integration creates opportunities for the application of social innovation design, presenting a broader practical context for design's involvement in social development. In the process of social innovation design, participants can perceive the internal trends of social change through design and follow these trends to provide better development guidance. The relationship between these two concepts is mutually reinforcing. This study aims to demonstrate how design can activate urban–rural resource flows, enhance community resilience, offer innovative pathways for integration practices, and bridge theoretical research with practical application. The following three case studies analyzed the specific modes of action and development possibilities of social innovation design in the context of urban-rural integration.

2. Social Innovation Design: Three Cases

To analyze the role of social innovation design in urban-rural integration, we have provided three cases of ongoing projects, so that innovative activities may produce more lasting and transformative results (Table. 1). These examples come from China, and they were selected for three reasons. First, the participants in the project all include designer groups and identify themselves as social innovation design projects. Second, they all use the countryside as the project site, and new connections have been created as a result of the project (during the case study process, we found that social innovations initiated in rural China will actively consider urban factors, while those initiated in cities will not actively connect with the countryside). Third, they clearly demonstrate three different models of how social innovation design can promote the bridging of urban-rural relationships. Our analysis did not involve ranking or scoring the outcomes of these projects. Instead, by analyzing the process of social innovation design, we identified and compared the pathways that facilitated urban-rural connections. Specifically, we interpreted the changes brought about by design across the three levels of 'production, life, ecology'.

Table 1. Case basics.

Rural type	Rural	Project title	Project period	Initiator	Key actors
Production dimension	Tieniu Village	Citrus Brand	2010-present	Designer	Designer + Local +Government + Enterprise + NGO
Life dimension	Suishi Village	Suishi public song fest	2022-present	university	University+Government +Designer + Local
Ecological dimension	Moon Bay Village	The 318-Tourist Route	2016-present	Government	Government +Designer + Local

2.1. Production dimension – interconnection of industrial structure: Tieniu village citrus brand

This social innovation design project was launched in Tieniu Village, Chengdu, in 2010. Tieniu's citrus industry accounts for 70% of the local villagers' livelihood. The production and processing of citrus are well-established in Tieniu Village, and the citrus industry chain has become the foundation for the design team to drive innovation and build a brand centered

around the "ecology of citrus." The team followed a systematic development route that went from ‘product sales (Ugly-Beauty Agan)’ to ‘village-enterprise joint ventures (Ugly-Beauty Tieniu)’ to ‘ecological planting (Fruit Farmers)’ to ‘professional service organizations (Tahoe Organic)’. They initially developed agriculture (primary industry) based on ecological planting, followed by extensive research and development of value-added products from the ecological rake orange (secondary industry), and then expanded into the tertiary industry through opening restaurants, hosting events, and offering user experiences (Figure 1). Social innovation has truly taken root in this process. The industrial chain gradually transformed from its initial simple form to a deeper processing level and a wider sales market. The relationship between urban and rural areas has become closer due to the complexity of the extended industrial chain. The spillover effects of capital, talent, technology and other factor resources have begun to emerge. Today, growth-oriented social innovation experiments continue to take place in Tieniu Village.

Figure 1. Social innovation activities in Tieniu Village
Copyright Tieniu Village Organisation

2.2. Life dimension – Interconnection of cultural activities: Suishi public song fest

The urbanization process in China has created a special urban community called “countryside in the city”. It refers to a natural village within an urban planning area that is surrounded, semi-surrounded or connected to a built-up area. Suishi Village is located in Panyu District, Guangzhou City, and is a typical “urban village”. Although it is geographically closely connected to the city, it maintains a distance from the city in terms of life and the

economy. This estrangement affects the governance of society as a whole. Starting in 2022, teachers and students from the Social Innovation Design Center at the School of Industrial Design, Guangzhou Academy of Fine Arts, initiated a series of public song fest, using singing—a highly participatory public cultural activity—as a starting point for "something happening," based on long-term research and engagement. The fest aimed to foster interaction between urban and rural residents (Figure 2). Through these music meetings, a rich artistic landscape and diverse cultural activities have developed, continuing the establishment of a public cultural community centered around Suishi Village. This form of cultural interaction transcends the boundaries of economic, cultural, and governance subsystems, facilitating the integration of these subsystems, and ultimately contributing to the formation of an extensive urban-rural system that bridges spatial and temporal distances.

Figure 2. Singing activities in Suishi Village
Copyright the Social Innovation Design Center at the School of Industrial Design, Guangzhou Academy of Fine Arts

2.3. Ecological dimension – interconnection of the landscape: the 318-tourist route in moon bay village

The village of Moon Bay is located in a river bay called Moon, which is formed by the confluence of dozens of small streams. The local government and the design team discovered the ecological advantages of this area, and used them as the basis for reshaping the concept of the Moon Bay area and initiating social innovation design practices. The project covers the villages along the river bay within a 10-kilometer radius, so that the villages around Moon Bay form a whole and work together to build an ecological corridor along the river. The designers selected important landscape nodes for design and

transformation (Figure 3). At the same time, driving routes from surrounding cities to the village were planned, linking scenic spots along the highway and establishing the "318" highway tourist attraction. The interconnection of urban and rural environments and landscapes was facilitated through the dynamic transformation of the scenery. In this project, leveraging the ecological advantages, various participants—including villagers, consumers, new residents, cooperative villages, and emerging businesses—were interconnected to promote local tourism, fostering connections at both economic and cultural levels. Using the "one river and one line" as a medium, a foundational connection was first established within the rural area, and then the region's brand effect was harnessed to attract urban resources, facilitating value co-creation and sharing. This process ultimately achieved a seamless interconnection between urban and rural areas.

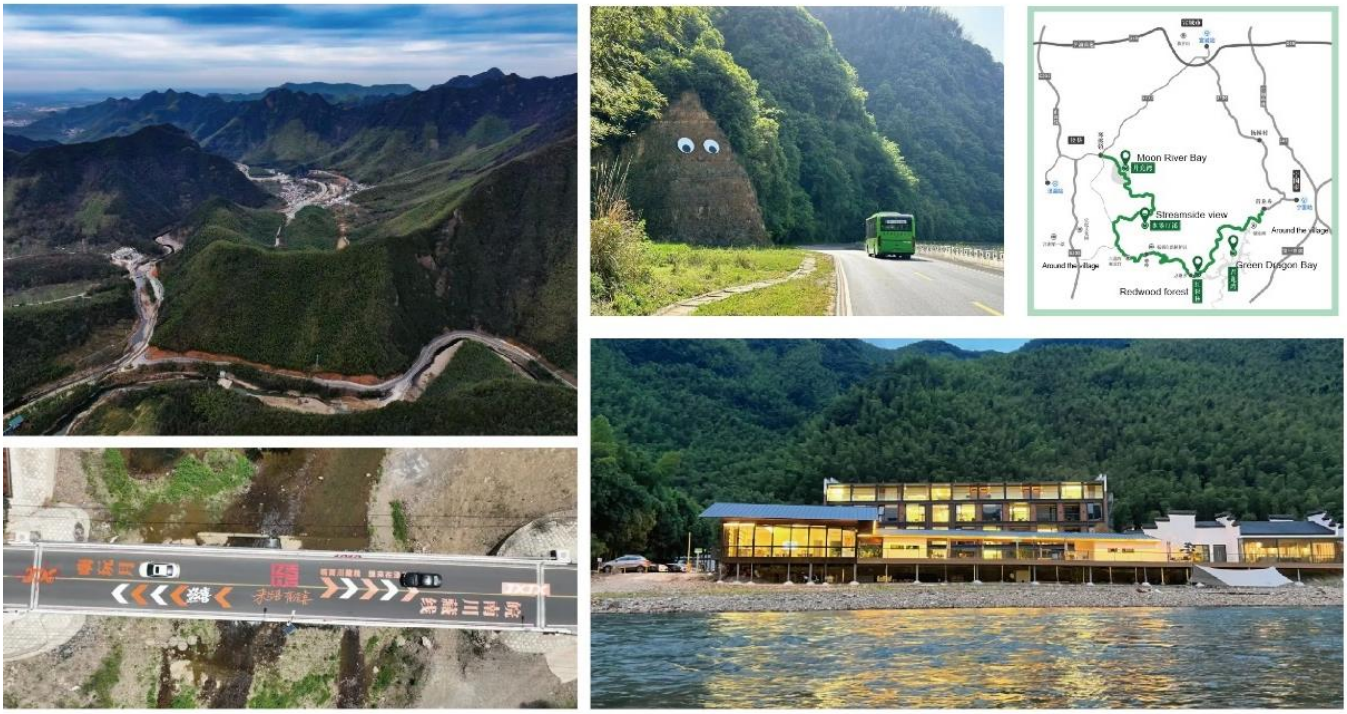

Figure 3. Scenery on the 318 Tourist Route
Copyright Moon Bay Village Organisation

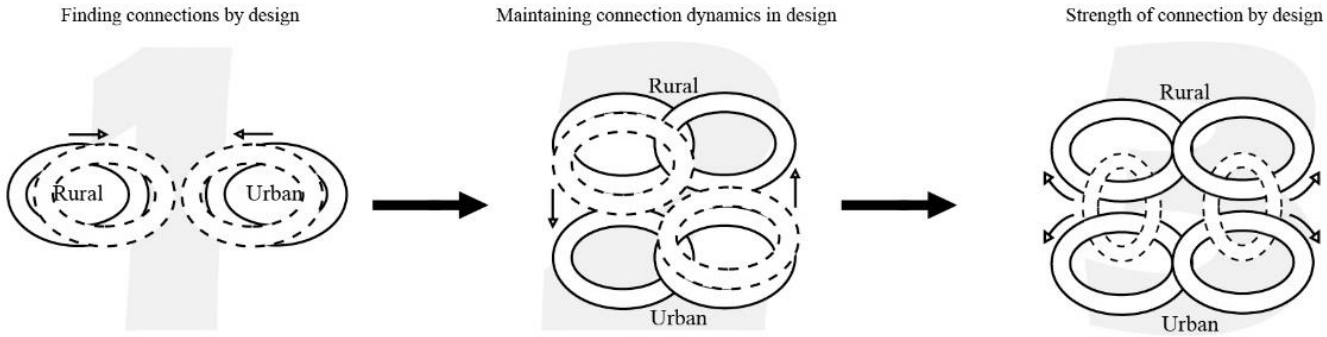

Figure 4. The path of urban-rural integration through social innovation design

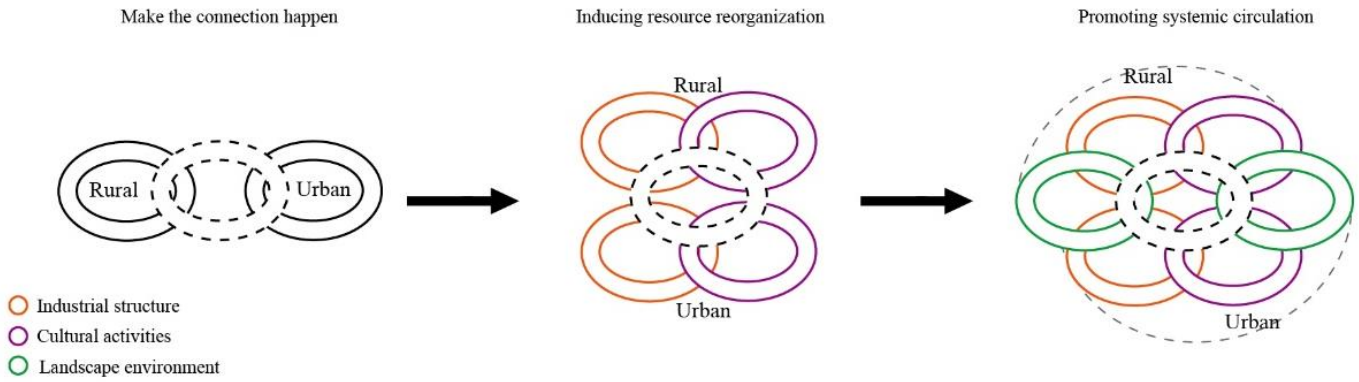

Figure 5. The role of social innovation design in urban-rural integration

3. Conclusion and Discussion

These three examples illustrate three basic models of how social innovation design can promote urban-rural integration: interconnection of industrial structure, interconnection of cultural activities, and interconnection of the landscape. Through a comprehensive analysis of these models, we have confirmed that in the context of modernization, social innovation design is closely intertwined with urban-rural development. Social innovation design is the medium that "makes connections happen". It can explore, create, and expand opportunities for integration between urban and rural areas (Hoggart and Paniagua, 2001). At the same time, social innovation design acts as a powerful tool for ensuring the sustainability of these connections throughout the integration process. It plays a pivotal role in guiding, planning, and integrating resources effectively. Thus, we propose an integration path consisting of three key stages: Finding connection by design, maintaining connection dynamics in design, and strength of connection by design (Figure 4). Additionally, we define the specific role of social innovation design in urban-rural integration as 'make the connection happen, inducing resource reorganization, and promoting systemic circulation (Figure 5). This framework aims to guide the practice of social innovation design within the context of urban-rural development. In this process, designers must not fall into the trap of one-dimensional design. Urban and rural construction is a systematic and long-term project. Although the three typical cases above are social innovation designs that cut in from different single dimensions, they are still continuing to develop, and the process of continuous optimization in the follow-up has driven the intersection and integration of the other two dimensions, as shown in Figure 5. Interestingly, the power of government cannot be ignored in social innovation design programs in rural China. Government support is a fundamental condition for the sustainability and scaling of social innovations in both urban and rural contexts.

This study was based on a Chinese case study, which was not globally applicable but

revealed the potential of social innovation design in restructuring urban–rural relations. The study found that prevailing practices were mostly from a rural perspective, emphasizing the attractiveness of rural resources to urban areas. Greater attention is needed to explore how urban-based social innovation can actively contribute to rural development—for example, through knowledge transfer or capital infusion. Underlying shifts in power relations and cultural contexts exert a profound influence on this process. Examples showed that sustainable innovation design often balances the tension between urban-rural areas by reshaping local discourse (e.g. villagers' participation in decision-making) and cultural translation (e.g. modernization of traditional skills). In this process, the key role of design is to build communication interfaces - facilitating the translation of needs and value consensus among different groups (e.g., villagers, designers, and government) through specific methods such as visualization tools and collaboration platforms.

Future research should further investigate: (1) mechanisms of innovation driven jointly by urban and rural actors; (2) the influence of power structure adjustments on the sustainability of innovation; (3) the tension between standardization and local specificity in cultural translation. These insights offer policymakers a novel framework for “flexible intervention,” whereby systemic transformation is coordinated with micro-level practices through design.

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Walking towards the Pluriverse: Rethinking Design Education through Relational and Situated Creative Practices

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ABSTRACT | Starting from the premise that we cannot face a crisis with the same categories that generated it, this investigation seeks to contribute to the exploration of new conceptual and creative horizons that support the transition towards a world where many worlds fit–the pluriverse.

Drawing on the contributions of various feminist and decolonial theorists and practitioners – as well as a study conducted in an academic institution – we would like to advocate for *situated creative practices* that can actively contribute to confronting the "civilizational crisis" we are experiencing; that is, a crisis in the civilizational model that is no longer generating the conditions to maintain life (Escobar, 2020). The reference to "situation" has a double connotation: on the one hand, it refers to creative interventions in specific places and times, paying special attention to the geographical and historical particularities of a certain context and, on the other, it refers to practices in which the practitioner positions herself critically with respect to the context in which she intervenes, a crucial notion in feminist (Haraway, 2013; Lugonés, 2003) and decolonial theories (Vázquez, 2020). We wish to argue that such approach can be a way of developing a *relational design practice* (Escobar, Osterweil & Sharma, 2024), allowing designers to be more sensitive and attuned with the communities with whom they work with and the natural environment where they operate, including a consideration for the more-than-human agents involved (De la Cadena & Blazer, 2018).

In order to begin illustrating the practical horizons for this framework, we will present a design practice conducted with undergraduate students in the Collserola mountain, a natural ecosystem in the edge of Barcelona. Through walking, sensory mapping, exploration with AI, and prototyping, participants explored the interplay between embodied experiences, memory, future speculation, and design. Walking the park fostered sensory engagement, shaping students' understanding of the site, its history and its inhabitants (human and more-than-human). This informed the development of projects addressing environmental concerns and promoting sustainable practices through reimagined spaces or objects, envisioning alternative futures and challenging existing norms. The methodology encouraged non-canonical reflection, urging students to move beyond conformistic approaches while fostering future-oriented critical thinking. The practice yielded valuable insights for design education and its potential in becoming a practice that can actively contribute to (sustainable) transition processes on two counts: firstly, by showing how integrating walking and sensory mapping into design processes can challenge space determinism, and secondly by demonstrating the potential of speculative design and future studies to foster alternative imagination and address pressing issues like climate change, promoting planetary awareness.

By further advancing on a specific framework for design (situated creative practices) and presenting a particular experience (workshop with design students in Collserola), through this paper we wish to highlight the potential –and limitations– that design practice and pedagogy may have in contributing to the emergence of other, more just worlds.

KEYWORDS | Pluriverse, Situated creative practices, Walking methodology, Speculative thinking, Design and/for sustainability.

1. Introduction

This paper stems from acknowledging that we cannot address contemporary crises using the same categories that originated them. The myriad of social crises we are faced with today can be seen as the expression of a rather simple –but all the more difficult to resolve– new condition: we no longer know how we can thrive together, as human and more-than-human inhabitants, on a damaged planet (Tsing, 2017). This becomes particularly relevant when confronted with a *civilisational crisis*, that is, a socio-ecological crisis in a civilisational model that is no longer generating the conditions to sustain life (Escobar, 2020). This crisis is manifested in different contexts (environment, economy, society, etc.) and has direct consequences like the acceleration and intensification of climate change, a massive increase in social inequality, an ongoing deregulation of the labour-market, the rise of populism and mistrust in (political) institutions or the allure of xenophobic movements. In all these instances it seems that we no longer have a place where we can live decently together, and care about inhabiting a shared world (Latour, 2018). The myriad of societal issues we are faced with today can be framed as what is referred to in theories of change as *wicked problems*, or high-complexity and deeply interconnected issues that cannot be addressed from a unique standpoint; a radically new orientation to recompose our relationship to others and the world is at stake. That is why this paper is backdropped by the work of Escobar (2011), De la Cadena & Blaser (2018), Demaria and other scholars and practitioners, who have been advancing an alternative framework to the paradigm of 'development', under the umbrella notion of *pluriverse*.

A concept first taken from the Zapatista movement in Chiapas (Mexico) -under the dictum 'a world where many worlds fit'-, the pluriverse represents perspectives that enact multiple worlds, ones that bring to the forefront the *buen vivir*[1], communal forms of living and the interdependence of all human and more-than-human entities. The pluriverse could therefore be framed within post-development and de-growth theories and movements, and strives to explore and develop (multiple) alternatives to an Eurocentric perspective on (sustainable) development (Kaul et al, 2022). In doing so, it represents a resistance to an universalist vision proposed by modern science, suggesting instead to expand the field of the possible for the emergence of new worlds: worlds where human life is in harmony with the life of the planet, where everyone has the conditions to live with dignity and where diverse ways of life are accepted and supported. Escobar has already advanced an agenda of 'Designs for the Pluriverse' (2018), where he discusses the potential of design (broadly understood) in becoming a pluriversal practice –that is, one that does not attempt to propose universalist solutions, but instead allows for different ways of life (with their corresponding epistemologies and ontologies) to emerge. We see this framing (of the pluriverse) as a useful lens to understand —from a systemic perspective— the challenges we face in an increasingly strained planet and design's potential role(s) in driving or triggering just and sustainable transitions.

After introducing some concepts and notions related to the pluriverse –and aiming to contribute more concrete examples and approaches within design practice and education– we will present a pedagogical exercise developed with a group of undergraduate design students in Barcelona, explain its results and discuss both its process and outcomes. In doing this, we aim to advance the ongoing discussion on the need for a *redirective design practice* (Fry, 2008), with a clear conceptual grounding (the pluriverse) and a first example of concrete practice (case study).

2. Theoretical Framework

2.1. Designing Relationally

A base premise for 'the pluriverse' is understanding that everything exists in a deep level of relationality and interdependence. This ought to be understood in contraposition to the paradigm of ontological dualism championed by the modern-colonial matrix of power (Escobar, 2018), which sees the human as separated from the territory, culture opposed to nature and where human beings (or a very particular group of white, male, wealthy individuals based in the global north) decide the fate of the rest of the world and its multiple life forms. We might then consider new "designing practices based on the insight that the world does not exist 'out there', separate from us, but that we co-construct it with every one of our actions. (…) Such designing might become a force in transitions to the pluriverse, with a multiplicity of others and all living forms." (Escobar, Osterweil & Sharma, 2024). Such understanding of designing demands designers to engage with concrete natural and/or human-made environments, as well as the different human and more-

[1] The term 'buen vivir' (roughly translated as *living well*) has its roots in South American indigenous cosmologies and it represents a critique to a unique idea of wellbeing based on (national) development and growth. Instead, at the centre of *buen vivir* stands a drive for a harmonious living of humans with their natural environment, the valorisation of other forms of (non-scientific) knowledge and ways of wellbeing that are not based (solely) on material elements (Gudynas, 2015).

than-human entities living in them, as opposed to engaging with the real from a distance with a false pretense of scientific objectivity (Lugonés, 2003).

2.2. On Situated Creative Practices

In order to further advance on design's potential roles in these processes, we would like to bring forth a particular perspective from the arts (fine arts, design, architecture), in which practitioners and researchers take on specific 'situated' approaches, in order to contribute to pluriversal agendas and transitions. The reference to 'situated' has a twofold connotation: on one side, it refers to creative interventions implemented in a specific place and time (and that would not make sense elsewhere) and, on the other side, it refers to practices in which the creative practitioner critically positions her or himself, a crucial notion within feminist (Haraway, 2020) and decolonial (Mignolo, 2011) theories. Such framing on Situated Creative Practices (SiCP) manifests a will to re-evaluate creative practices -and their learning structures-, at the same time as enabling practitioners' potential for making an impact in their direct social environment.

When speaking about the site and time-specific dimension of such practices, it is important to acknowledge the influence of approaches advanced since the 1960's within the fields of art, architecture, design and pedagogy. A common trait in these experiences is the articulation of a 'social' perspective (Bishop, 2005), calling for a renewed -social, political, environmental, cultural- responsibility of practitioners towards the contexts where they operate. The practices resulting from such processes can be framed as a sort of 'creative activism' and usually materialize via concrete interventions in specific historic-geographical contexts.

On the other hand, regarding the critical positioning of the practitioners, such approach is built upon the premise that knowledge is not the same everywhere or for everyone (Kaethler & Calderón Salazar, 2020), and that the only way to oppose the globalizing force of modernity is by critically identifying our place of enunciation, that is, the onto-epistemic place from where we operate. It follows that "a positioned self cannot assume to be the center of the world, a positioned self is always conscious of the radical plurality of worlds and histories around her" (Vázquez, 2020). Tim Ingold also challenges the concept of a global environment as a unifying force, arguing instead that it represents the culmination of human separation from the world (2010). This separation stems from our tendency to observe events from a distance, rather than actively experiencing them, locally. The Nasa indigenous peoples of south-west Colombia have brought forward the notion of *walking the word*, as a practice that allows them to ground their ideas and collectively –and constantly– negotiate them through walking (Calderón Salazar, 2021); such approach allows us to envision some strategies (e.g. walking) to advance in ever more situated practices.

2.3. Pilgrimage, Wander and Walk

> "But the *dérive* includes both this letting-go and its necessary contradiction: the domination of psychogeographical variations by the knowledge and calculation of their possibilities." (Debord, 1981)

Our globalized lives tend to numb our senses, disengage from our surroundings and damage the environment. In this sense, the notion of localness isn't simply a narrower view; it represents an engaged, perceptual interaction with the components of our

inhabited world, not a detached observation. Subtle interventions like walking (Certeau, 1984) and more proactive initiatives like tactical urbanism (Lydon and Garcia, 2015) showcase the potential of citizens to creatively shape their urban spaces. Building on this, Catalan psychiatrist Francesc Tosquelles (1947) emphasized the cognitive power of walking, suggesting that it is not the head that counts, but the feet. He advocated for collecting the intuitions gathered through walking, viewing it as a cultural heritage inscribed in both natural landscapes and the anatomy of the places we traverse.

On another side, Guy Debord and the situationists began practicing the *dérive* (drifting), which involves aimlessly and unstructurally exploring cities, guided not by typical reasons like work or leisure, but by the inherent allure of the surroundings and their psychological and creative impacts (1981). This concept, although akin to the *flâneur*, is shaped by urban studies, particularly the work of Henri Lefebvre (as cited by Evans, 2013) on *The Right to the City*. Such approach also corresponds to feminist (and) decolonial theories like that of Maria Lugonés, who argued for a situated practice of engaged theorizing, under the figure of *the streetwalker theorist*: “done as a pedestrian, *una callejera*, *en compañía*, in the midst of company, and obliterating the theory/practice distinction, this theorizing seeks out, puts out, entrusts, invokes, rehearses, performs, considers, and enacts tactical-strategic practices of resistant/emancipatory sense making" (2003).

Finally, Michel de Certeau reminds us that walking serves as an intervention in space, leaving no physical marks (1984) while inviting the city and nature to co-create experiences. It necessitates a deliberate slowing down, fostering appreciation of our surroundings and the value of time (Bruscato Portella, 2024a). As an act of exploration and imagination, walking becomes the foundation for a new design approach, one which denotes the subjective visceral inner happenings of the individual. From this experiential standpoint, our understanding deepens as we immerse ourselves in the world, seeking knowledge and meaning. It is through this attentive engagement, inherent in the act of dwelling, that the world progressively reveals itself to us (Ingold, 2010, pp. 214-216).

2.4. Speculative Design for Transitioning to the Pluriverse

Speculative design is an approach where designers create products or objects linked to imagined scenarios of how things might be (Dunne and Raby. 2013, p. 2). These scenarios can occur in the future, alternative pasts, or even present situations. It requires people to suspend their disbelief and allow their imaginations to wander. Designers and scholars Anthony Dunne and Fiona Raby draw an analogy to thought experiments, showing the shared ability of both approaches to explore possibilities through imagination. This allows us to “step outside reality for a moment to try something out” (2013, p. 80). This analogy has become widely accepted in the field of design and even extends to the realm of art. Within the realm of design, the speculative design approaches serve to promote critical reflection among individuals. This reflection can not only generate new perspectives on current realities but also encourage people to envision their desired future. Such acts of imagination contribute to public discourse on contemporary issues like emerging technologies, climate change, and capitalism (Dunne and Raby, 2013).

However, Howell et al. draw attention to the Eurocentric foundations of the speculative design theories. They provide a critical perspective, emphasizing that the cone's depiction of time as purely linear and progressive neglects alternative viewpoints (as cited by Carey et al., 2022). The speculative design method, as a result, may overlook the social, political, and environmental contexts necessary for these artifacts to emerge, along with

their broader implications. This perspective underscores the need for a more nuanced design process, advocating for a shift towards a more plural, inclusive and life-centered approach. In searching for such alternative practices, we posit the possibility of speculative design experiments that serve as triggers for transitioning to the pluriverse. This would imply applying the ideas of a situated creative practice presented before and using the potential of speculative thinking (enabled by the 'what if' question, Figure 1) to open up the possibility of imagining and collectively building other worlds. The following section will present a case study of a pedagogical practice that one of the authors of this paper led with a group of undergraduate design students in the Collserola mountain, a natural ecosystem on the edge of Barcelona.

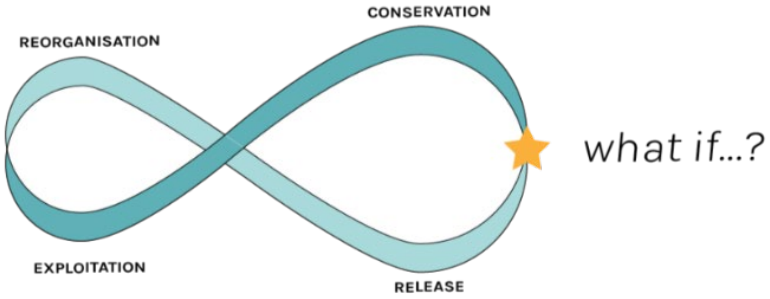

Figure 1. The diagram is an adaptation from the "adaptive cycle", considering the potential of speculative thinking to unleash the possibility of alternatives. Adapted from Holling et al., 2002.

3. Case Study: A pedagogical design approach at a park in Barcelona

The workshop "Take the Memory Out for a Future Walk" (Bruscato Portella, 2024b) made use of an interdisciplinary methodology to design new responses to urgent current challenges, fostering a deep interconnection with nature and all living organisms. The main question posed to the students was: "How might you envision the future of the Collserola Park?". The proposal was designed for a group of 25 people, aged between 17 and 23 years, during the Projects I course in the Bachelor in Design at EINA University School of Design and Art of Barcelona in 2022. The methodology was delivered by one of the authors of this research in five sessions, each lasting three hours and 30 minutes, for a total of 18 hours and 30 minutes.

The pedagogical approach started at a chosen area in the Serra de Collserola Natural Park and continued in the university's classroom, which is located next to one of the park's entrances. This geographic advantage was an opportunity for students to deeply engage with the nature around them and its challenges. This park, spanning 8,000 hectares in Barcelona, is a vital ecological haven under pressure from urbanization and recreational activities. Despite its biodiversity and scenic value, human impact—ranging from soil erosion and waste generation to wildlife disturbance—threatens its sustainability. Traditional awareness campaigns have proven insufficient in driving behavioral change (Abrahamse and Matthies, 2018). Instead, design and speculative thinking may have the potential to unleash radical new ways of thinking in relation to the natural environments that we inhabit, and all the beings that we share them with.

The main purpose of this pedagogical experience was to present an interdisciplinary methodology to design new responses to urgent challenges related to sustainability and the connection between nature and the different –human and more-than-human– entities inhabiting the Park. It is also aimed at:

- **Stimulate critical reflection**: Encourage students to reflect on the park's historical memory and envision its future possibilities amidst climate change and other uncertainties.
- **Embrace embodied methodologies**: Integrate walking and sensory cartography as design tools to enhance spatial, contextual, and proprioceptive awareness, placing students as active citizens and actors in the territory.
- **Promote a sustainable city, connected with nature**: Address and explore the perceptual breadth of space and cultivate a deeper appreciation for immediate natural spaces, to generate responsible stewardship for the environment.
- **Challenge with speculative design and future thinking**: Introduce students to methods for imagining alternative futures, urging them to embrace uncertainties and generate flexible design solutions.
- **Explore artificial intelligence's creative potential**: Introduce and experiment with artificial intelligence (AI) tools like Dall-e and Midjourney to enhance future visioning and design exploration.

By analyzing the outcomes, we unveil the power of a grounded sensory exploration (through walking) and speculative design in reimagining living spaces and fostering critical engagement with the non-human world.

4. Methodology

This didactic experience consisted of walking around the park and carrying out different conceptual actions subsequently, all within a period of 21 days, from November 22nd to December 13th, 2022. Classes were dedicated to a set of activities that allowed students to practice and acquire the competences of the subject, being the last one the final presentation. These phases or creative actions are detailed below in four pedagogical activities (followed in chronological order): 1) sensory walks and cartographies, 2) speculating on possible futures, 3) brainstorming with AI, and 4) drawings and materialization.

The pedagogical methodology (Table 1) weaved together art, design, ecology, earth science, and technology. Through dedicated walks within chosen territories, students drew sensory cartographies that captured the spatial essence. Engaging with AI tools, they then generated diverse future hypotheses and design possibilities. These explorations resulted in proposals that ranged from spaces and maps to relational objects in face of climate emergency, all informed by the affective encounters with the site. The methodology encouraged non-canonical reflection, urging students to move beyond conformistic approaches while fostering future-oriented critical thinking.

Table 1. Case Study Pedagogical Methodology.

Session	Activity	Learning Objectives
Session 1	Introduction	• Introduce the project brief and subject matter • Overview theory of speculative design and design references
Session 2	Sensory Walks and Cartographies	• Embark on slow, intentional and contemplative explorations within the park through walking • Foster sensory engagement, shape students' understanding

		of the site, its history and its inhabitants (human and more-than-human) • Translate experiences into hand-drawn cartographies to capture spatial features, affective memories, observations • Identify and highlighted issues and concerns to promote action
Session 3	Speculating on Possible Futures	• Introduce a taxonomy of uncertainty through thought-provoking questions to anticipate and imagine the park in upcoming years
Session 4	Brainstorming with AI	• Discuss ethical considerations of AI tools • Explore how AI could be used to enhance each student's design process or avoid hitting creative blocks
Session 5	Drawings and Materialization	• Formalize concepts through detailed drawn models and prototypes resonating with chosen scenario • Debate results collaboratively

The first situated activity consisted of inviting students to embark on contemplative explorations within the territory of the park. By interacting *in situ*, students were encouraged to wander meditatively and immersively, engaging in mindful observation, recording sounds, making sketches, taking pictures, and reflecting on the space's past, present, and potential future. This situation provided a "direct experience (body and mind) of the place, where the spatial and sensorial stimuli are retained directly by the student without direct interference" (Espinheira-Gomes, 2022, p. 21). Back in the classroom, students made hand-drawn sensory cartographies, identifying and highlighting various issues and concerns within the park (Figure 2). These included: distribution of drinking water, waste collection practices, noise pollution sources, soil sedimentation patterns, differences in day and night lighting, views accessible from various points, and even services deemed lacking in the area, such as sustainability-driven educational centers. Additionally, certain maps pinpointed the presence and location of specific animal and plant species within the park's ecosystems.

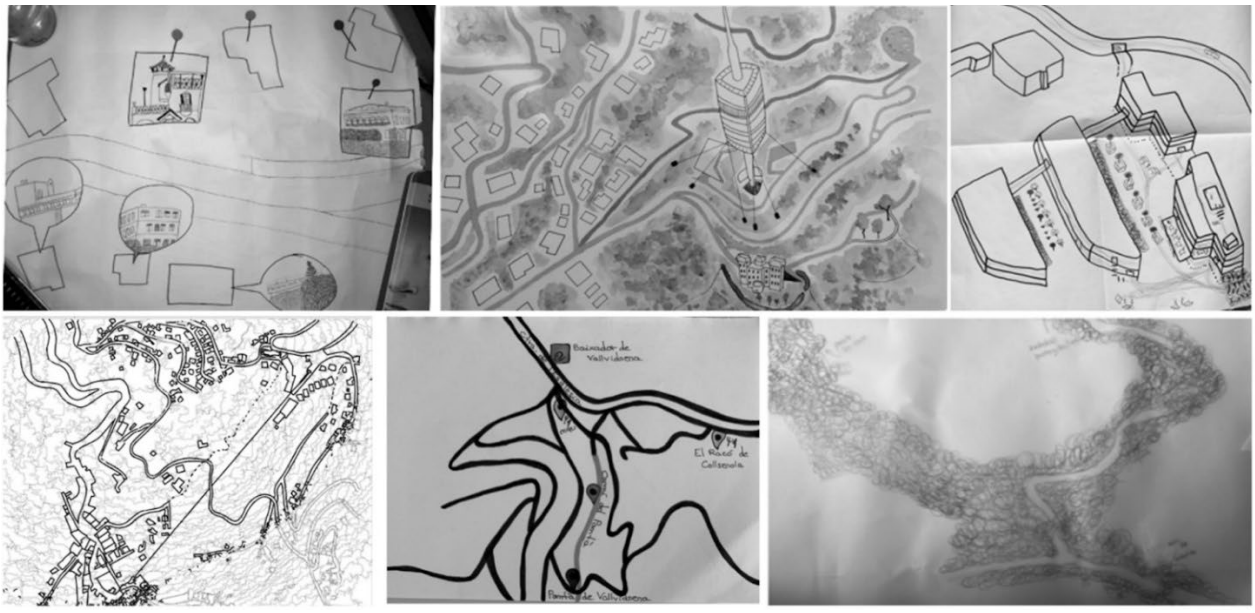

Figure 2. Examples of sensory mappings by the students.

In a second phase, we embraced a "possibilist" mindset to stimulate students in ways of being with uncertainty (Ichioka and Pawlyn, 2021, p. 15). Within uncertainty, students could see an opening to a pluriverse of possibilities, a "world where many worlds fit" (Escobar, 2018, p. xvi). These possibilities emerged from co-creative processes of futuring, in which all students participated as separate but intertwined roots of the human-nature ecosystem comprising the park. By referring to a framework designed by the researchers, they put together themes, opportunities and scenarios for the areas walked during the previous practice, guided away from certainty/uncertainty binaries and toward relational, pluriversal readings, acknowledging uncertainty as a fundamental condition of ethical cross-cultural partnerships, building their own "what if...?" hypothesis, and opening space for a pluriverse of possible futures ignited by imagination and agency (Table 2).

In a [...?] future		**There's a [...?]**		**Related to [...?]**		
Beautiful	Black	Building	Monument	Animals	Superstitions	Imagination
Brilliant	Fun	Instrument	History	Cities	Ground	Justice
Creative	Queer	Device	Organization	Climate change	Science	Leisure
Decolonized	Reactionary	Disaster	Toy	Death	Space	Love
Just	Resistant	Festival	Product	Economy	Music	Residue
Fast	Sad	Flag	Public service	Education	Spirituality	Ocean
Feminist	Selfish	Food	Ritual	Energy	Home	Creation
Solidary	Intelligent	Game	Song	Natural environment	Transport	Feminism
Global	Sustainable	Piece	Route	Family	Dialogue	Heritage
Green	Exciting	Invention	Tattoo	Agriculture	War	Experimentation
Technological	Volatile	Work	Tool	Genetics	Walk	Seasonality
Cheerful	Wild	Kit	Video	Governance	Food	Territory
Innovative	Wise	Manual	Clothes	Health	Water	Listen
Happy	Hot	Machine	Public space	Identity	Art	Touch
Open	Mystical	Map	Archive	Neighborhood	Childhood	Mountain
Affectionate		Mask	Place	Roots	Cure	Culture
				Elderly	Migration	Urbanism
					Furniture	Agriculture

These first possibilities of interaction were further explored formally using Generative AI's potential to test its limits and possibilities of image generation tools such as Dall-E and Midjourney, while enabling students to conceptualize or visualize their hypothesis Our goal was not to replace drawing, model making, computer-aided design (CAD), rendering or any of the other conventional disciplinary design skills; instead, we wanted to critically inquire how AI could be used to enhance students' individual design process, or explore how it could be used to avoid hitting creative blocks. After discussing the ethical considerations and creative possibilities, students engaged in simple demonstrations of prompting to generate visual narratives, evoke sensations and engage in playful form exploration. Students embraced AI exploration in diverse ways. Some used the generated images as a form-finding tool to expedite or augment their existing process. Others sought to envision future projections for their chosen intervention sites. Still others discovered that the AI-generated outputs nudged them in unexpected design directions.

Notably, while most of the students found AI tools valuable, some preferred their usual working methods such as drawing or 3D modeling, suggesting personal preferences and existing skillsets that may not align with every digital tool. Finally, after explorations with AI tools, the students returned to hands-on work, elaborating drawings and 3D models of their proposals.

Ultimately, it is also important to highlight that the element of uncertainty was a persistent factor in this methodology, due to our inability to fully control the outcomes of each of the workshop activities, leading to unexpected results. This lack of predictability provided a fertile ground for speculative thinking, creative exploration and empirical learning, benefiting both the instructor and the students.

5. Results

In total, 25 projects ranged from experimental sculptures and sound devices to proposals for buildings, repurposed spaces, and urban furniture for the community. Each proposal was rooted in the students' affective and sensitive experience gathered during their exploration in the park, while simultaneously aiming to generate ethical and sustainable contributions for both humans and non-humans inhabiting the area. Several students explored different formulations for the concept of "memory" through their proposals. Some aimed to capture and preserve elements of the present or past, ensuring they stay alive even 100 years into the future. Others tackled present-day issues and challenges, offering concrete solutions with an eye towards improving the park's state for future generations.

To evaluate the effectiveness of our pedagogy, we analyzed the student projects with an emphasis on both individual and collective processes and outcomes, and the relational impact within the Collserola Park natural surroundings and community. Focusing on ecologic consciousness, experimentation, and agency, we looked for indicators of how students navigated uncertainty as a "fundamental condition of ethical partnership" (Archer-Martin and Stokes, 2023). Where the workshop was most successful in enhancing planetary thinking and agency was in relation to climate change, and in producing outcomes that were socio-culturally restorative, ecologically regenerative, or both. This became clear, through the design of a speculative public installation that visualized sea-level rise in Barcelona through an interactive 3D viewer (Figure 3) and raise awareness on the environmental impacts that this situation creates. Another example is the inclusivity of humans and non-humans materialized in a multifunctional fountain at Vallvidrera Reservoir (Figure 4) to cater both humans and animals in a future of water scarcity, blending functional, regenerative and resilient design.

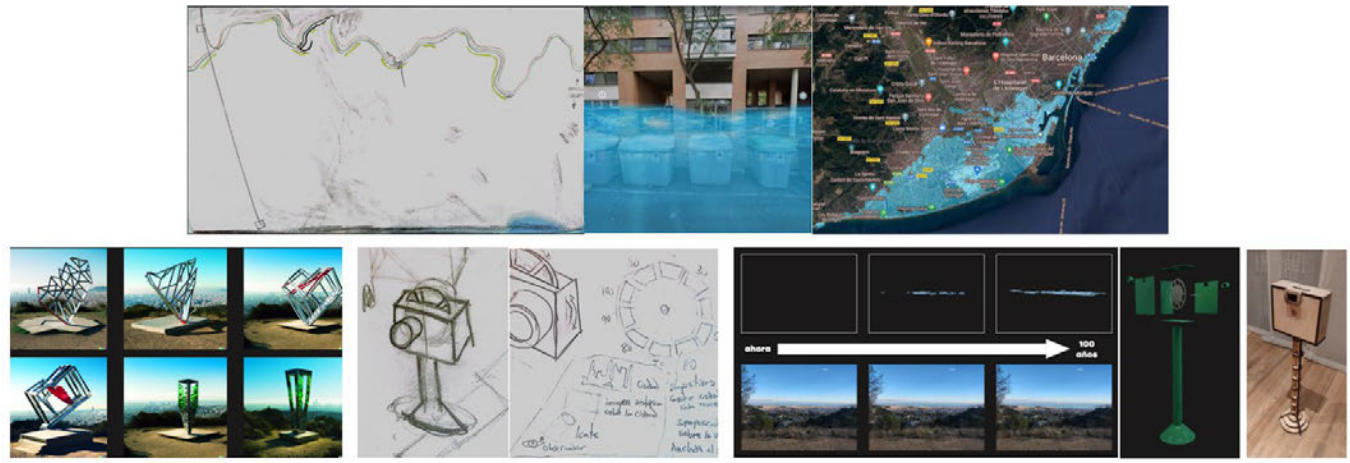

Figure 3. Project from student Pedro Figueroa. Hypothesis of Barcelona's flood and research with AI tool Dall-e: “Photograph of a large, polygonal methacrylate object inspired by the potential self-destruction of civilization, situated on a hill overlooking Barcelona in the background”; drawings and model for Bygone Waters project. From the binoculars, users would see the water levels over Barcelona and could change the number of years to see the flooding progress. 2022.

Figure 4. Project from student Carolina Abelleyro. Expectation and reality comparison; fountain which is not accessible to animals in the Vallvidrera Reservoir; map with walking paths and animals; research with Midjourney with prompt “A fountain where people, earth animals and birds can drink, and animals can bath integrated in the middle of the forest”; mock-up of the fountain for humans and non-humans. 2022.

Where our pedagogy initially appeared less successful was in demonstrating engagement with local community or natural resources knowledge through the project. Many of the works did not explicitly engage with –or include– local materials from the area, nor representations of the natural flora or local communities. One of the few exceptions was the aforementioned fountain, as well as another circular design project that proposed a light installation for poorly lit pathways where neighbors circulate, recycling discarded plastic bottles while connecting with situated historical context (Figure 5). One reason for the low local engagement might be that students were in their first semester, therefore at an initial phase of their design education, where notions of recycling, sustainability or community engagement are not yet present in their creative process mindset. Students, therefore, were not fully ready or equipped with the tools necessary for creating solid regenerative and ethical work. This may point to a broader deficit in the design curriculum that should be considered by educators, but may also indicate that indirect ecological and situated learning can take place with these

kinds of pedagogies. Ultimately, this revealed a misguided assumption that sustainable use of materials and community engagement should be taken for granted in the design process of undergraduate students, encouraging educators to think of explicit strategies to enhance these approaches in the students through didactic and pedagogical exercises.

Figure 5. Project from students Elisabeth Boix and Martí Forcada. The surprising unrelation between Google Maps and the two cartographies that illustrate the memories and routes taken by students in the Collserola; photographic research (1897-2022); speculations with AI tool Dall-e with prompt "Light stairs forest gravel plastic concrete"; Process and final model of the Calloway lamp. 2022.

6. Discussion

As western academia and conventional pedagogical approaches often discourage students from explicitly introducing both subjectivity and alterity into their work (Archer-Martin and Stokes, 2023, p. 192), this research posits the value of a situated perspective in design. This implies acknowledging that a disengagement from the concrete does not result in scientific objectivity (Lugonés, 2003) and our (research and creative) practices can be enriched by understanding our positionality and the relation with *others* (including more-than-human actors). This approach equips aspiring designers with skills to envision possibilities that intentionally adopt diverse positions and perspectives on self, others and the world (Bruscato Portella, 2024a). Moreover, it might advance discussions around the influence of the ecological crisis in the future of the design profession, to act agentically and to discover possibilities within constraints. Such approach might be understood as a condition for *designing relationally*, as it leads to practices that are embedded within the context that they operate and acknowledge the acute interdependence of all the actors involved.

The presented pedagogy shows the value of incorporating walking and drawing experiences, exploring experiential futures and speculative thinking into design education and research. On one hand, the fact of beginning the process by engaging directly with the territory in 'wanderings' or 'dérives' allowed for a grounded experience that attuned students' sensibilities to the different stimuli present in the park –something that would have been rather difficult to achieve with a more archive or documentation-based approach. On the other hand, this experience demonstrates how these approaches can

stimulate creative thinking, foster deeper and embodied understanding of space, and encourage exploration of alternative, potentially more sustainable or disruptive futures. This could be evidenced by the ways in which the *Framework model for speculative hypothesis generation* (Table 2) enabled the design of scenarios that went beyond a straightforward 'solution', triggering instead other ways of thinking about our relation to the natural environment. By prompting students to move beyond conventional interpretations of space and engage with sensory mapping and speculative design, this project pushes against rigid design practices, encouraging the consideration of both human and non-human needs. This led to more inclusive and speculative design solutions, challenging spatial determinism.

7. Final Considerations

In this paper, we have attempted to contribute to the ongoing discussions on the responsibility of design in an increasingly strained (socially, ecologically, culturally, etc.) planet. We have done so by advancing on a specific framework for design (situated creative practices) that may represent a starting point for *designing relationally* and by sharing and discussing a particular experience with design students in Barcelona. In that sense, we find it important to disclaim the potential impact and shortcomings of our framing through one concrete example: one of the desired outcomes of the experience with the students was a change of mindset (or transitioning to another way of thinking and acting within the world), which cannot by its very nature be achieved in the short term. The workshop did, however, inspire action and stimulate new perspectives and immediate reflections on the issues at stake. This can be summarized by a comment of one of the participating students: "I can see more and more clearly the need to create spaces of connection with nature. I start from the selfish future situation that has destroyed the forests and has become completely urban. Because just as in the forest you can hear the sound of the wind before it arrives, we must be able to see our reality, before there is no return" (Student Zaira Soler, 2022). So as much as we cannot assess the effective transition to more sustainable scenarios, the proposed projects served as seeds or triggers that highlight the potential that design practice and pedagogy may have in contributing to the emergence of other, more just worlds.

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WHY ARE THE WORKING ENVIRONMENTS ON INTERNATIONAL AIRPORTS AMONG THE LEAST INCLUSIVE PLACES TO WORK AND SOME POSSIBLE SOLUTIONS FOR IMPROVEMENT

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ABSTRACT | Working is a fundamental aspect for the social participation and inclusion of people with visible (e.g. motor, visual) and invisible (e.g. autism, chronic pain) disabilities (1). However, for this to happen, the working environment must be inclusive (2) and unfortunately, this is not the case of workplaces such as airports. On one hand, there are regulations in place in some countries, such as Canada, that are supposed to enable such accessibility (3). These regulations, however, do not consider the different needs and specific scenarios that people with disabilities may face. On the other hand, the airport as a workplace is an interesting and rich environment due the wide variety of job opportunities. However, most airports are still not adapted for people with disabilities. For example, an airport employee usually must walk significant long distances through environments difficult to navigate and full of sensory stimuli such as Duty-Free shops. The main objective of this research project is to provide recommendations to the federal government of Canada on the norms of accessibility on employment at international airports. In addition, we aim to identify job opportunities as well as airport facility-related obstacles and

facilitators for people with visible and invisible disabilities. Semi-directed interviews (n=24) are being conducted with personnel from the airport, airlines, customs, and security at 3 Canadian international airports (4-5). An evaluation of the accessibility of the physical environment of the 3 airports is being done by applying the Rick Hansen Foundation Accessibility Certificate (RHFAC). The preliminary results of the 3 airports targeted for this project will be presented at the Cumulus conference in Nantes 2025. Two important findings have emerged so far, i) the need for comprehensive education on disabilities in the different sectors of the airport working environment; and ii) the urgency of rethinking the basic design of airports to make them more accessible.

KEYWORDS | PEOPLE WITH DISSABILITIES, ACCESSIBILITY, AIRPORT, WORKING ENVIRONNMENT, CANADA

1. Introduction

Having a job is very important for social participation, as employees are contributing members of society. Moreover, it provides a feeling of being productive and fulfilled. Earning money also contributes to the individuals financially independence. Unfortunately, people with disabilities face numerous barriers in finding employment. Poor health and fear of losing disability benefits are major obstacles (Stolarczyk, 2023). Discriminatory attitudes from employers, lack of information about rights and opportunities, and workplace adaptation issues also hinder employment (Okutayeva et al., 2024). Many employers hold stereotypes about people with disabilities, often assuming they are less capable, less productive, or need more support than they actually do. These pervasive stigmas might not always be explicit but can impede job access. For example, employers might worry that a person with a disability will require too many accommodations or that they won't fit into the workplace culture. These assumptions can lead to fewer opportunities for people with disabilities, even if their qualifications and abilities match the job requirements. Other barriers include concerns about disclosing disabilities, and lack of accommodations (Gewurtz et al., 2016). Employers perceive workplace adaptation and transportation access as significant challenges (Paušić et al., 2021). As a result, people with disabilities may face challenges in accessing physical areas of the workplace (e.g., offices, restrooms, break rooms, meeting spaces) due to inadequate ramps, doorways, or elevators. In some cases, the layout or equipment may not be adaptable for wheelchair users, people with mobility challenges, or individuals with other physical impairments. Even seemingly minor barriers, such as the height of a counter or the location of storage, can create significant challenges for employees with disabilities. Additionally, lower education levels among people with disabilities further limit job opportunities (Sozańska, 2013). All these elements create great insecurity, due to potential health issues and the fear of losing disability benefits (Stolarczyk, 2023). Nevertheless, while health problems make traditional full-time jobs difficult, contingent and part-time work can enable employment for some (Schur, 2003). Facilitators for employment include reasonable work conditions, adjustments, and accommodations (Colom Toldrá &

Santos, 2013). To improve employment prospects, focus should be on equal education, unbiased hiring processes, and ongoing disability management in the workplace (Kicherova & Lozovaya, 2022; Colom Toldrá & Santos, 2013). However, when looking for workplaces for people with disabilities, an airport is probably one of the most challenging environments. Working in an airport demands adaptability due to the 24/7 nature of air travel. Employees often work in shifts, including nights, weekends, and holidays. Dealing with irritated passengers facing flight delays or cancellations requires exceptional patience and diplomacy. Moreover, employees must adhere to strict regulations, policies, and security measures to maintain the airport's integrity, often facing pressure from tight deadlines and crowded terminals. Regulations like EU Regulation 1107/2006 require airports to ensure accessibility (Raman, 2011; Wood, 2022). Some airports in countries with a long inclusive tradition (e.g. Sweden, Denmark, New England) have established and implemented advisory committees and accessibility features to go beyond minimum requirements, respectively (Burke & Welbes, 2018).

However, inconsistencies in accessibility features and services persist across airports (Gotti et al., 2024). Barriers include complex navigation, limited communication, and inadequate staff training (Gotti et al., 2024; Kwan, 2010). To improve accessibility, airports should consider adjusting workstations for various disabilities (Polak-Sopinska et al., 2017) and adopt universal accessibility standards (Kwan, 2010). While progress has been made, achieving full equality for disabled workers will require ongoing effort and commitment from the aviation sector (Wood, 2022; Toffin, 1998). Despite the huge variety of different jobs opportunities that an airport may offer, most of them are still not adapted for people with disabilities. For example, an airport employee usually must walk significant long distances through environments difficult to navigate and full of sensory stimuli such as the Duty-Free shops.

The main objective of this research project is to provide recommendations to the federal government of Canada on the norms of accessibility regarding employment at international airports. In addition, we aim to identify job opportunities as well as airport facility-related obstacles and facilitators for people with visible and invisible disabilities.

2. Methodology

Semi-directed interviews (n=24) are being conducted with personnel from the airport, airlines, customs, and security at three Canadian international airports. The name and location of the airports, the airline, and the agencies involved in this project cannot be disclosed due to confidentiality agreements. It is, however, possible to mention that there were three international airports of different sizes located in different provinces in Canada and that representatives of the different agencies involved in air travel were interviewed.

An evaluation of the accessibility of the physical environment of the 3 airports was done applying the Rick Hansen Foundation Accessibility Certificate (RHFAC). The Rick Hansen Foundation Accessibility Certification (RHFAC) tool is a standardized assessment instrument designed to measure, evaluate, and certify the accessibility of built environments. Developed by the Rick Hansen Foundation, this tool is evidence-based and assesses how well buildings, public spaces, and infrastructures meet the needs of individuals with diverse physical, sensory, and cognitive disabilities (Rick Hansen Foundation, 2022). The tool aims to promote inclusion by identifying not only existing barriers but also opportunities for improvement to achieve a high level of universal accessibility. The RHFAC is a systematic assessment tool that evaluates accessibility across

multiple dimensions, including building entrances, pathways, elevators, restrooms, accessible parking spaces, and adapted signage. Each dimension is examined using specific and detailed criteria outlined in an evaluation grid. For instance, entrances must allow unobstructed access for individuals using wheelchairs, while pathways are assessed for their width, presence of ramps, or slip-resistant surfaces. Additionally, the tool evaluates lighting, visual contrasts, and signage quality to ensure infrastructures are intuitive and user-friendly for individuals with visual or cognitive impairments. What distinguishes the RHFAC tool from other evaluation approaches is its scoring system, which provides an overall accessibility score reflecting the built environment's accessibility level. A building that meets the established standards may receive official certification, with levels ranging from minimal compliance to excellence in accessibility. This score is complemented by specific recommendations, enabling infrastructure managers to make targeted improvements.

3. Preliminary results

Of the three airports targeted for this project will be presented at the Cumulus conference in Nantes 2025. The results are presented in two sections: the semi-directed interviews and the RHFAC results.

3.1 Semi-directed interviews.

Our findings have been classified into different themes. Since the research is still in progress, we will only present three themes, namely: improvements in facilities, barriers within the type of work, and non-physical barriers.

I. Physical improvements in facilities: There was a genuine concern and effort on the part of the three targeted airports to try to make the work and customer areas more accessible. Unfortunately, many airports have been built at different stages, to which new areas has been added as air traffic has increased significantly over the last 50 years. Therefore, the newer parts of the airport are considerably more accessible, excluding the walking distance which is a constant barrier at all airports. Conversely, the older facilities, despite renovation works, still present some accessibility problems, such as narrow paths or long walking distances.

> *"So, we have really removed as many physical barriers as we possibly can. There's some, you know, in older terminals because we can't physically change certain aspects of it, but we have tried to, you know, make pathways as usable as possible." P14.*

In terms of job adaptations at the airline for PWD, there is an effort to accommodate workers in some positions.

> *"... there are people I work with that have disabilities. I can think of at least 3 colleagues with visual disabilities, and they have been accommodated by (the airline). There are modifications that are made, there is openness to make accommodations. It is quite empowering to see, is quite lovely to see because they are able to successfully do their job." P13*

II. Barriers within the type of work: we asked the participants if they believed that people with disabilities would be able to fill their positions, with the current state of accessibility practices.

The answers were generally negative, especially with regards to physical disabilities. The airline agent commented:

> *"In my role it would be a little difficult, I have to be able to push a wheelchair, walk long distances up to ten thousand steps a day. I would say my position is a physical job. One also must use the radio for example and so if you have a hearing impairment for example that might be challenging." P12.*

Among the participants were several agents from different agencies working at the airport. Some of them have to carry a firearm with them. This makes a very important difference from other job positions as the person has to be able to use the weapon effectively for their own safety and the safety of those around them. This limits many people with disabilities.

> *"Well, it depends on the disability, right? If it's a physical disability, it's gonna be a big challenge because this job, you're a (...) officer. You have to be able to do a lot of physical things. You have to be able to lift. You have to be able to run. You have to be able to shoot a firearm. You have to be able to engage in controlled defense tactics, if you're dealing with a subject that becomes combative, right?" P11*

III. Non-physical barriers: we also asked what other barriers existed in the work they performed for people with disabilities. One officer mentioned regarding the language barriers:

> *"So, language is gonna be the number one kind of barrier. Our officers do what they can with the communication, you know, unofficially they'll try to communicate if they can, you know, Google Translate, you know, on the computer, they'll try to communicate in the language of the traveler." P11.*

With regards to an overview of the different services offered by the airport, one participant commented as follows.

> *"I think the biggest challenge is, you know, I don't want to say communication barriers, but the empathy piece that's missing, like, sometimes depends on who is helping you. Some people are nicer than others, so, it's that inconsistent service." P14.*

3.2 Rick Hansen Foundation Accessibility Certificate (RHFAC)

Concerning the analysis of the data, we obtained from the RHFAC is currently being analyzed. In order to provide an idea of what has been made, in this section we will present only some examples of certain aspects of the three airports that were evaluated, but not all of them.

a) Entrances and Circulation Areas Identified Issues:

- Non-motorized doors: Most doors leading to restricted areas are not motorized, posing significant barriers for employees with physical disabilities. These heavy doors, combined with unsuitable handles, complicate access to workspaces.
- Cluttered corridors: Some hallways, measuring less than 1.2 meters, fail to meet universal accessibility standards. Additionally, stored items such as carts or technical equipment further restrict movement.
- Strengths: Circulation areas appear well-defined and segmented, facilitating orientation. However, their width and the lack of equipment adapted to the needs of individuals with reduced

mobility require adjustments.
● Improvements Needed: Automating main and secondary doors is essential to ensure effortless access. Clear protocols to prevent hallway clutter should be implemented, such as designated storage areas for carts.
Accessibility Score: 6/10

b) Workstations Identified Issues:
● Work surface heights: Counters and fixed surfaces are often unsuitable for employees in wheelchairs, forcing them into uncomfortable postures.
● Insufficient space under desks: Lack of adequate clearance beneath work surfaces prevents optimal use by individuals with mobility aids.
● Strengths: Workstations are well organized and equipped for routine tasks. However, they fail to accommodate the specific needs of employees with disabilities. ● Improvements Needed: Adjustable-height work surfaces would provide greater flexibility.

c) Inadequate Equipment Identified Issues:
● Fixed, non-adjustable computer monitors and telephones lacking accessibility features (e.g., voice commands or compatibility with hearing aids).
● Strengths: Technological equipment is present and functional. However, its design does not adhere to universal accessibility principles.
● Improvements Needed: Investment in adjustable monitors and telephones compatible with hearing aids would enhance inclusivity. For instance, telephone headsets with voice commands would benefit employees with visual or motor impairments.
Accessibility Score: 5/10

d) Signage and Wayfinding Identified Issues:
● Lack of tactile markers: Common areas and restricted zones lack tactile strips or differentiated textures to guide individuals with visual impairments.
● Insufficient visual contrast: Signage, often difficult to read, lacks adequate contrast between text and background.
● Lack of audio and visual announcements: Important announcements, such as safety alerts, are not delivered in multiple formats, excluding individuals who are hard of hearing or visually impaired.
● Strengths: Marked and labelled areas are a positive initiative. However, their design does not account for multisensory accessibility principles.
● Improvements Needed: Adding tactile strips for wayfinding and enhancing visual contrast on existing signage should be priorities. For instance, signs should use contrasting colors, such as white on black, with large-format characters. Announcements should always include subtitles or visual signals.
Accessibility Score: 4/10

e) Evacuation Plans Identified Issues:
● Non-accessible emergency stairwells: Absence of evacuation chairs or lifting platforms in emergency stairwells, making exits inaccessible for employees with reduced mobility.

● Lack of refuge areas: Buildings lack designated safe zones where individuals with reduced mobility can wait for assistance. General Comments:
● Strengths: Multiple emergency stairwells are an asset, but their accessibility is limited.
● Improvements Needed: Installing evacuation chairs or lifting platforms in stairwells is essential. For example, automated wheelchair descent systems could significantly improve safety. Creating refuge areas equipped with emergency communication systems would also secure individuals with reduced mobility.
Accessibility Score: 3/10

4. Discussion

As it was mentioned before, this research project aims to determine what are the job opportunities as well as the obstacles and facilitators for people with visible and invisible disabilities at airport facilities. As the preliminary results suggest, there is growing recognition of the need for inclusive design in airports and regular and comprehensive disabilities awareness training for current and potential workers. Emphasis should be placed on taking into account a range of disabilities beyond physical impairments (Gotti et al., 2024). In accordance with the literature that we can find on this subject, many challenges include inconsistent accessibility features, complex navigation, and limited communication (Gotti et al., 2024). To address these issues, researchers advocate for adopting a biopsychosocial model of disability, redistributing power in design relationships, and facilitating user empowerment (Webb & Williams, 2018). Inclusive design should consider factors such as signage, visual contrast, and materials (Smith & Dropkin, 2012). Studies highlight the importance of staff training, improved infrastructure, and enhanced communication to create seamless travel experiences for passengers with disabilities (Koech et al., 2024). Similar principles apply to educational institutions, where inclusive design should address diverse needs beyond physical accessibility. Ultimately, inclusive design aims to extend active participation in daily life, work, and social contexts (Langdon et al., 2008). In the following paragraphs, we will discuss the main elements considered to have inclusive working environments at the airports, such as education, physical environment and potential job positions. Education. Currently, many airport environments can be challenging for people with disabilities due to both physical barriers (like inaccessible workstations, counters, or bathrooms) and attitudinal barriers (such as lack of understanding or awareness about how to support employees with disabilities). Therefore, in order to create more inclusive workplaces in airports, there needs to be:

• Comprehensive Training Programs: Employees in all airport sectors (from ground staff to security to customer service) should receive disability awareness training. This training should cover both the practical aspects of supporting colleagues with disabilities (such as offering assistance when needed or adjusting work practices) and the more nuanced aspects of respecting and empowering people with different abilities.

• Cultural Shifts in Leadership and Management: Educating airport management and leadership is essential to make inclusive hiring and workplace policies a priority. Leaders need to not only foster an inclusive culture but also be role models for positive attitudes towards disability in the workplace.

• Recruitment and Retention Strategies: Airports should develop strategies specifically aimed at recruiting employees with disabilities. This includes creating mentorship programs, offering reasonable accommodations, and providing career development opportunities that are accessible to everyone, regardless of ability.

• Intersectionality and Accessibility: Educational initiatives should go beyond the traditional understanding of disability to incorporate the diverse range of conditions, including mental health issues, neurodiversity, and chronic illnesses. Airports must be prepared to support employees across this full spectrum. By focusing on education and building awareness, airports can cultivate an environment where people with disabilities not only have the opportunity to work but can thrive within their roles, ensuring a more diverse and dynamic workforce. Physical environment.

Moreover, passenger-centered accessibility is often a focus, while employee working environments are equally important, yet often overlooked. Rethinking airport design with accessibility in mind can involve several key aspects:

• Physical Accessibility for Employees: This includes ensuring that all areas of the airport (from office spaces to staff rooms, storage areas, break rooms, and other facilities) are designed with universal access in mind. Features like adjustable-height desks, accessible restroom facilities, wide doorways, ramps, and even assistive technologies like screen readers and voice-activated devices can make a big difference in enabling employees with disabilities to work comfortably and effectively.

• Workstation Customization: Rethinking airport design also means considering how each individual workstation or task space can be adapted to meet specific needs. This could include tactile signage, voice-controlled systems, or adaptable furniture that can accommodate different physical needs, like adjustable desks for wheelchair users or ergonomic setups for those with repetitive strain injuries.

• Mobility and Transportation Access: Employees who have mobility impairments need to be able to move easily between various parts of the airport. Airports often require staff to cover long distances, and accessible shuttle buses or pathways, automatic doors, and elevators are critical in ensuring that everyone can do their job without physical barriers. Additionally, employee parking spaces should be appropriately designated for people with disabilities.

• Emergency Evacuation Plans: An often-overlooked aspect of design is the ability to evacuate employees with disabilities in case of an emergency. Airports need to create emergency protocols that specifically address how people with physical or cognitive impairments will be safely evacuated during an emergency. This requires the inclusion of accessible escape routes, adequate signage, and specially trained emergency response teams.

• Collaboration with Experts: Rethinking airport design for inclusivity should not only come from architects and airport planners but also from people with disabilities themselves. Involving disability advocacy groups and consulting with disabled employees helps to identify and eliminate overlooked barriers in the work environment. Both points emphasize that creating a truly inclusive airport environment requires thoughtful design at both the educational and physical levels. Education helps to remove the stigma and fosters understanding, while redesigned spaces help to remove physical barriers that might prevent employees from reaching their full potential.

Potential job positions

Airports, being large, dynamic workplaces, offer a range of job opportunities that can be made accessible and inclusive, provided that reasonable accommodations are in place. Here are only a few examples of job opportunities for people with disabilities in airports, categorized by different types of roles and departments. This section of the discussion was completed in part during the interviews and complemented with additional information that the research team collected regarding the organizational structure of some international airports:

Customer Service and Passenger Assistance. Many airports have dedicated positions aimed at helping passengers with disabilities, which can be a great fit for individuals with disabilities who are willing to assist others.

• Passenger Assistance Officer: This role involves helping passengers with mobility impairments or other disabilities navigate the airport. Tasks might include assisting with boarding, navigating security checkpoints, providing directions, or helping with luggage. Employees in this role might be stationed at check-in counters, security, or boarding gates.

• Customer Service Representative: Airports need customer service staff at ticket counters, lounges, and information desks to assist all passengers, including those with disabilities. These roles often require good communication skills and the ability to handle various requests or concerns, such as providing information about accessible facilities or helping with special accommodations.

Assisting passengers with security and safety, unfortunately at times when a firearm is needed, many people with different conditions are excluded, such as people with motor impairments or sensory condition that affects their ability to ensure the safety of others in the event of an incident. That being said, with the appropriate training and accommodations, some people with disabilities, other than the ones mentioned before, could be trained to handle various security and safety-related positions within the airport.

• Security Officer: While this job may seem physically demanding, certain roles within airport security, such as screening passengers or luggage, can be adapted to accommodate people with disabilities. For example, there may be positions in scanning or surveillance monitoring where an individual could use accessible technology or equipment from a seated position.

• Security Support Roles: Individuals with disabilities may also work in roles such as managing security systems, reviewing surveillance footage, or even handling administrative tasks within the security department.

Ground Operations and Maintenance Ground operations involve a wide variety of tasks related to the physical aspects of airport function, many of which can be adapted to suit employees with different disabilities.
• Aircraft Service Roles: There may be positions related to maintaining and servicing aircraft in which people with disabilities could be trained to work. For example, administrative roles within the maintenance department or positions that involve coordinating schedules, inventory, or communication could be accessible.

Administrative and Office-Based Jobs Airports need a wide range of office-based professionals in roles that often don't require physical labor but rather administrative, organizational, and managerial skills.
• Human Resources (HR) Personnel: In HR departments, individuals with disabilities can perform a variety of roles, from recruitment to employee support and development. People with disabilities can also work in diversity and inclusion roles, helping to ensure the airport's recruitment processes are accessible and inclusive.

• Data Entry and Administrative Support: Many airports need people to handle data entry, records management, and general administrative tasks. These roles often involve working with software systems to track flight schedules, passenger information, or baggage handling, which can be easily adapted to individuals with mobility impairments or other disabilities.

• IT and Technical Support: Airports rely on a large network of computers and technology for their day-to-day operations. IT support and network management roles are ideal for people with technical skills, especially those who have disabilities that don't impact their ability to work with technology. These roles often involve troubleshooting, providing technical support to other departments, and maintaining the airport's computer systems.

• Marketing and Public Relations: Airports have marketing departments that handle communications, public relations, social media, and advertising. People with disabilities who have skills in writing, graphic design, video editing, social media management, or marketing can easily contribute to these roles.

Airports typically have a variety of retail outlets, restaurants, and concessions that require staff to interact with customers, manage stock, and ensure that operations are running smoothly.
• Retail Assistant: This can involve roles such as cashier, sales associate, or store manager. People with disabilities who are comfortable working in a customer-facing position or in the back end (stocking, organizing, inventory management) can easily adapt to these roles with the right accommodations.

• Restaurant Staff (Including Management): People with disabilities can work in various roles within restaurants and food concessions, such as waitstaff, kitchen staff, or even in management. Many airports are focusing on making their food services more inclusive, both for staff and customers, by providing accessible kitchen spaces and customer service training for employees.

Aviation-Related Roles In the aviation industry, there are specialized roles that individuals with disabilities can pursue, depending on their interests and training.

• Flight Dispatcher: Flight dispatchers are responsible for flight planning, tracking aircraft, and ensuring safe operations. These roles are often office-based and involve high levels of organization and technical knowledge, which can be done by individuals with disabilities who can work in office environments.

• Air Traffic Control Support Roles: Although becoming an air traffic controller requires extensive training and certain physical abilities, there are other support roles in the air traffic control environment, such as monitoring radar systems, scheduling, or coordinating between departments. These roles may be more accessible for people with disabilities who can work with technology and coordinate data.

Specialized and Advisory Roles People with disabilities often bring unique perspectives to problem-solving, which can be particularly valuable in roles focused on improving accessibility and inclusive design.

• Accessibility Specialist: Airports are increasingly focusing on improving accessibility for passengers and staff with disabilities. Accessibility specialists work on ensuring that facilities, policies, and services meet the needs of people with disabilities. This could involve auditing facilities, consulting on new designs, or recommending changes to improve accessibility.

• Disability Inclusion Officer: Many large organizations, including airports, are creating roles focused on fostering diversity and inclusion. A Disability Inclusion Officer or similar position would be responsible for advocating for people with disabilities in the workplace, ensuring that hiring, accommodations, and workplace culture are inclusive. This role could be ideal for individuals with disabilities who have an interest in promoting equal opportunities and a more inclusive work environment.

5. Conclusion

Creating an inclusive airport working environment requires dismantling the multiple and multidimensional systemic barriers faced by people with disabilities. This transformation calls for action on several dimensions: organizational culture, regulatory framework and infrastructure development. First, employers need to become more aware of disability-related issues, both in terms of their attitudes and their policies. They must go beyond strict compliance with the rules, to adopt a genuinely inclusive mindset. Second, government policies and advocacy groups can provide more robust support for raising awareness of disability rights and creating meaningful incentive for employers to hire people with disabilities. Finally, greater investments in workplace accessibility, such as designing inclusive workspaces and providing technology that meets the needs of disabled employees, will go a long way in breaking down these barriers to employment. Ultimately, creating an inclusive workforce means recognizing that the barriers faced by people with disabilities are not the result of their limitations, but of systemic constraints in society. Addressing these issues at both the individual and organizational levels can help create more equitable opportunities for everyone. Finally, for the

potential job positions, the key is ensuring that accommodations are available, whether that's physical adaptations to workspaces (e.g., ramps, adjustable desks, ergonomic furniture), adaptive technology (screen readers, voice-activated software, hearing aids), or flexible work arrangements (e.g., flexible hours, remote work). By implementing such features, airports can contribute to the development of inclusive spaces where every worker can thrive. Airports are increasingly recognizing the value of building a diverse and inclusive workforce and are making significant strides in hiring people with disabilities. Many airports are working to implement inclusive hiring practices, disability awareness training for staff, and partnerships with organizations that specialize in employment for people with disabilities. Ultimately, the types of jobs available for people with disabilities in airports are vast, and the opportunities will continue to grow as airports become more committed to creating inclusive, accessible environments. This commitment not only advances workplace inclusion for people with disabilities but also enriches the aviation sector through the unique perspectives and innovative solutions that emerge from a truly diverse workforce. Results dissemination plan: This research project findings will be disseminated to the federal government of Canada, our partners (airports, disability groups) and the scientific community (de-identified data) using presentations, written reports, social media and scientific articles.

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Chapter 3

DIGITAL ETHICS

From UX to Ecosystems, from AI Ubiquity to AI Acceptability

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ethical leadership
a new frontier for design
JUNE 3-7, 2025
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Cumulus Association
L'ÉCOLE DE DESIGN Nantes Atlantique

FUTURES DESIGN: A COURSE FOR SOCIAL INNOVATION THROUGH SPECULATIVE DESIGN.

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ABSTRACT | Speculative design rises as an emerging discipline that, rather than solving problems in a traditional way, proposes alternative futures to make visible and reflect on current social, environmental, and technological issues. According to Dunne and Raby (2013), this practice challenges established norms and conceptualizes the future as a moldable entity shaped by our present actions.

In this context, the elective course "Futures Design" at EASD Castelló fosters experimentation and critical reflection through the creation of prototypes and narratives that address structural social issues, with the aim of stimulating creative thinking, co-creation, and debate around social and environmental problems.

KEYWORDS | SOCIAL INNOVATION, SPECULATIVE DESIGN, FUTURES DESIGN, SOCIAL DESIGN

1. Introduction

The role of the designer has evolved to encompass more than simply solving problems by stylizing the form of objects. In today's world, issues are not merely functional but also emotional, social, and political (Guixé, 2013). Speculative design proposes unreal future scenarios—whether possible or not—which are often dystopian. The future is not a distant and strange realm beyond our reach; it is shaped and defined by our desires, our dreams, and depends on the actions we take in the present. Therefore, the future is concrete, tangible, moldable, open, capable of being designed, and not singular but multiple.

Anthony Dunne and Fiona Raby (2013) presented speculative design as a discipline linked to the exploration of possible futures—a means to question and reflect on the implications of emerging technologies, sociocultural changes, and contemporary issues in the present. This approach departs from the conventional idea of design as “problem solving.” In this new perspective, designers are invited to propose and create new artifacts and narratives that challenge established perceptions and norms. In their book *Speculative Everything*, Dunne and Raby propose that speculative design is not a tool for guessing or predicting the future, but rather for drawing alternative futures—concrete possibilities that serve as starting points for discussion and reflection, thereby opening the debate on current issues. The design and prototyping of diegetic objects (speculative artifacts) within narrative scenarios serve as vehicles to embody visions of these proposed alternative futures.

Speculative design opens doors to social innovation by generating new perspectives and awareness of complex and emerging structural social problems. In doing so, it challenges current dominant narratives and encourages critical reflection to inspire significant and original changes in the face of social challenges.

At the EASD Castelló, for the past three academic years, an elective course has been offered to fourth-year design students—transversal to all specializations—in which speculative design is put into practice. In this course, futures design is used to speak, manifest, make explicit, and denounce some of the current structural issues. The overarching goal of the course, “Futures Design,” is social innovation.

We work with a methodology that embraces experimentation and provocation as tools to question and challenge the status quo of a current issue (chosen by each working group). We use Joseph Voros’s Cone of Futures as a strategic foresight tool to propose futures with multiple ramifications. In doing so, the students build a narrative and design and produce diegetic prototypes that help tell this story. The project concludes with a real exhibition/installation within the school.

Some of the objectives of the course are to awaken and develop critical, analytical, and holistic thinking; to promote forums and debates for reasoned defense of ideas and values; to foster empathy; to develop critical creativity to anticipate various issues; and to encourage co-creation and collaboration.

Novel methodologies, such as those used in speculative design, go beyond merely imagining possible futures or scenarios, allowing us to make visible, analyze, and ciriticize the social, cultural, political, and environmental issues that influence our way of life. Dunne and Raby (2013) support this idea precisely: fostering alternative scenarios to provoke critical reflection on society. On the other hand, Sterling (2015) employs the concept of "design fiction" to explore the overlap between technology and culture. Denouncing social tensions and promoting debates around social innovation are aspects championed by collectives such as Superflux (Bleecker, 2009).

In the UK, the London College of Communication offers a postgraduate course titled MA Design for Social Innovation and Sustainable Futures. This postgraduate program at UAL (University of the Arts London) adopts an interdisciplinary approach that seeks to hybridize social innovation, sustainability, and design. It equips students to address and generate solutions for complex social problems through design.

In the USA, this discipline is somewhat more widespread and integrated into the curriculum. For example, in the article *Designing the Future of Everything*, the CCA (California College of the Arts) describes collaborations between its students and major companies such as Samsung, Lenovo, or Google, who worked on design projects that explore possible futures for various aspects of human life. These projects also considered sustainability and social well-being. Topics included the evolution of homes for new generations, hybrid work, and future social networking. In New York, the Parsons School of Design offers programs that integrate Futures Design and Social Innovation into their curriculum. Its Certificate in Future Studies and Speculative Design focuses on developing students' skills to create representations of both desirable and undesirable futures using specific theories and methods. In this way, students learn to apply this knowledge to influence project development and company direction. These studies last one academic semester. Additionally, Parsons offers a Master's in Design for Social Innovation and Sustainable Futures, which reflects the school's commitment to providing quality training that anticipates and shapes possible futures, integrating social innovation and sustainability into professional practices.

In Ontario, Canada, the OCAD University offers the Social Innovation Design Pathway for students interested in using design as a tool to solve social issues. The program enables students to address social challenges that directly impact the community. Students acquire skills in creating balanced and sustainable solutions to improve daily life, working with concepts such as equity, environmental sustainability, and responsibility. Collaborative

projects with an emphasis on critical thinking facilitate the development of these programs, aligned with an ethical approach to design.

In Spain, design schools such as ESDI Ramon Llull (Barcelona) include courses in their curricula—such as Futures and Narratives Design; Design and Innovation; Ecodesign versus Sustainability; Systemic Design and Circular Economy; and Comprehensive Design Management—in the third year. ESDI offers programs that approach futures design by developing proposals that analyze social, technological, and environmental trends. The focus is on speculative design and the search for innovative solutions to improve future quality of life. However, in our country, these disciplines and methodologies are not yet well established.

This study poses the questions of whether the new course implemented at EASD Castelló is valuable for the students, based on the results obtained, and whether the school's faculty is receptive to this type of course, and considers it important to include in the design curriculum.

2. Formatting rules

2.1. General Guidelines

METHODOLOGY

In 2022, the Escola d'Art i Disseny de Castelló (EASD Castelló) introduced the "Futures Design" course as an elective transversal to all the disciplines offered at the school (from graphic design, to interior design, product design, and fashion degrees). The topics covered have been very varied, although social innovation has always been the central theme. In the last two editions, the incorporation of AI as a tool in projects has marked a turning point in the short life of this course.

Based on the work and ideas of Dunne and Raby, the course engages in a dialogue with topics of current interest such as sustainability, ethics, and technology (including the emergence of AI in our world), thereby challenging the dominant vision of progress and the future in our developed society. These actions invite a critical reflection on our present actions, which will have an impact on the future. According to the authors, this approach allows us to explore areas where social issues become visible and enables participants to adopt new ways of thinking and acting.

The course defines a number of competencies that students are expected to acquire, as well as learning outcomes which are detailed in the corresponding teaching guide. The objectives are as follows:

1. Prepare students for social and global challenges
   Speculative and critical design are not only useful tools to anticipate possible changes but they also allow us to challenge current social models and the status quo, and to propose creative solutions (Dunne & Raby, 2013). This forms the basis of the course.

2. Foster autonomous, critical, and creative thinking
   Students learn to tackle the complex, everyday problems that surround us, moving beyond a focus on functional design solutions. In this regard, social innovation is a key component of speculative design, which should aim to transform social structures in a more equitable and sustainable way (Mulgan, 2010).

3. Collaborate on interdisciplinary projects
   Futures Design is a multidisciplinary course. This approach encourages collaboration among students from different backgrounds, allowing issues to be explored and addressed from various perspectives. Manzini (2015) highlights the importance of interdisciplinary collaboration in addressing today's social challenges, as it leads to more inclusive and impactful solutions.

4. Develop competencies for social innovation and sustainability
   As mentioned above, social innovation is the ultimate goal of the course, in line with Phills, Deiglmeier and Miller's(2008) view that social innovation should focus on making a positive impact on communities, improving their well-being, and fostering long-term social change. Design must be a driver of social change and sustainability in contemporary society, as Sharpe (2013) asserts.

5. Boost creativity and applied research
   Koskinen et al. (2011) affirm that creativity is fostered through applied research in design, allowing students to explore the future through research and prototyping, thereby developing innovation and problem-solving skills in changing contexts.

6. Foster empathy
   Fostering empathy among students is crucial to developing their ability to understand the realities and needs of different groups. This enables them to design ethical and inclusive speculative solutions to emerging social issues. Tim Brown, CEO of IDEO, states that "empathy is essential to understanding the people for whom you are designing" (Brown, 2009). This underscores the importance of developing the capacity to put oneself in another's place—a key element in creating ethical and inclusive solutions.

Typically, graphic design project courses apply the Double Diamond methodology proposed by the Design Council. However, in this elective course, the methodology is a combination of various foresight, speculative, and participatory techniques designed to provide students with a comprehensive, critical, and reflective perspective on the future in a creative manner. In doing so, it becomes possible to propose futures that are more sustainable, inclusive, and resilient.

Foresight, according to Godet (2006), allows us to explore, identify, and evaluate emerging trends and their impact on the future by proposing various scenarios and strategic actions to address them. Identifying potential vulnerabilities that indicate shifts in current trends helps students anticipate how these changes may evolve into alternative scenarios, enabling them to visualize and anticipate possible futures and make present decisions that will influence them (Godet, 2006).

The construction of future scenarios plays a crucial role in speculative design. According to Dunne and Raby (2023), this not only serves to explore the future but also promotes reflection on the values and social implications of anticipated changes. It enables the creation of hypothetical, speculative narratives by combining variables and uncertainties, allowing students to visualize futures—utopian or dystopian. This open critical perspective departs from the linear view of a single future and opens the door to proposing multiple and complex futures. It also fosters critical reflection on our present decisions and their medium- to long-term implications (a point of personal interest). The use of Voros's Cone and Wheel of Futures is one of the key tools employed.

The backcasting process, as defined by Robinson (2004), is also part of the methodology. It involves starting from a desired future and working backwards to identify the steps necessary to achieve it. In other words, students are asked to analyze the present, think about the future, and conduct a historical review from the past to understand why a certain situation exists.

The course also emphasizes participation and collaboration, particularly in its second half. Manzini (2015) asserts that social innovation is key to designing sustainable futures emphasizing the need for active participation of communities and future generations in design processes. The formation of multidisciplinary teams comprising students from various design disciplines (graphic, product, interiors, fashion, and soon, illustration) emphasizes the inclusion of diverse voices and perspectives. This multiplicity enriches the project by incorporating different values and needs into future scenarios, promoting inclusive and equitable solutions, and fostering a sense of empathy among group members—a factor I consider crucial in design education.

Finally, as a complement the methodology implemented over the years, the development of diegetic objects and the construction of prototypes—as suggested by Bleecker (2009)—are

useful tools both for forecasting and for stimulating critical and reflective thinking about the possible futures which the students are creating. The prototypes and artifacts trigger debate on the chosen themes, inviting students and the entire educational community to reflect on the social, ethical, and cultural implications of the design proposals. This is achieved by communicating and exhibiting each group's work in various ways within the EASD Castelló building, thereby involving the broader school community in the debate.

DEVELOPMENT

The course content is addressed individually and autonomously during the first half, while the second half is carried out in multidisciplinary teams dedicated to project development. The structure is divided into two main parts:

A1. Content

- Artificial intelligence applied to design. Introduction to AI: Midjourney and ChatGPT. Ethics and responsibility of the design professional.
- Design research. Crisis, society, and design policies. Types of design research: Ezio Manzini. Emerging design. Critical and speculative design. Modes of criticism. Co-design.
- Projecting the future. The Cone of Futures. The Wheel of Futures. Applied methodologies.

A2. Project

- Topic selection
- Mapping
- Backcasting
- Scenario
- Diegetic object
- Production, assembly, and communication

The first part is highly attractive and stimulating for students, particularly through learning tools such as ChatGPT and Midjourney. AI is becoming a fundamental resource in design, even despite the opposing voices that have emerged upon its introduction (some of which I have experienced firsthand), as it allows for the rapid and precise generation of text and images (Radford et al., 2018).

In the design research section, Manzini's approach provides a key perspective on the capacity of design to contribute to social and environmental change and innovation through co-creation and citizen participation. This prepares the ground for the final group project, making explicit the benefits of this working method. In this context, Manzini, drawing on the

pioneering studies of Christopher Frayling, describes the three categories of design research: *For Design, About Design,* and *Through Design.* To help students assimilate these categories and identify them in any project—including their future final degree projects—case studies of various design projects are analyzed.

Moving into futures design, the conceptual model of the Cone of Futures, proposed by Joseph Voros (2000) (and based on authors such as Hancock and Ogilvy), is used as a visual representation in the future proposal that students develop for their final project. It examines the possibilities of probable, plausible, possible, and preferable futures. This tool graphically represents uncertainty and the breadth of long-term scenarios, facilitating reflection on various potential paths from the perspectives of design and foresight.

The Wheel of Futures, proposed by Jerome C. Glenn, helps visualize more clearly the consequences of events, ideas, or trends by identifying first-, second-, and third-order effects—both positive and negative. Its radial and centrifugal representation is extremely useful for gaining an overall perspective.

Possible topics and their future scenarios are first developed individually and then defended in front of classmates. Once the groups are formed, the students meet to discuss and debate which of the proposed topics is most suitable to develop collaboratively as a final project.

Each group begins to develop and build a future around the chosen subject, constructing the narrative arc of the story they wish to tell. The planning and design of the diegetic object(s) to be integrated into this story is a crucial element of the project and encourages significant engagement from all group members.

Evaluation

There are two types of activities which are evaluated in the course (using an evaluation rubric): an individual component (accounting for 35% of the final grade, covering the content) and a group project (worth 55% of the final grade). The remaining 10% of the grade is determined by peer assessment. This component is given great importance, instilling an extra sense of responsibility in the students as they become active contributors to the course's final results. If the peer assessment score does not exceed a 5, a final exam must be taken in order to pass the course.

The final group project allows each student to develop and apply all the knowledge acquired during their undergraduate studies, enriching the project and enhancing the complexity of the chosen topic.

RESULTS

Below are two projects undertaken by students in the course—one from the first year of implementation and the second from the most recent academic year.

Project 1 (2022): Neurotypical Extinction (Figure 1)

Students: Elisa Giustacchini (Erasmus), Victoria Monleón Beltrán, Luna Ramírez Alcoceba, and Isabel Salas Pérez

"Neurotypical Extinction is a multidisciplinary speculative design project. It presents a plausible future in which an imaginary world is created in which, due to increased levels of environmental pollution (a black swan event), there is an exponential growth in the population of people with Autism Spectrum Disorder (ASD). Within this envisioned space, various diegetic objects have been created to narrate and construct this future world, addressing the needs and preferences of a person with ASD in the year 2100, in which a neurotypical individual would have much more difficulty adapting. The work invites reflection on how, currently, citizens with ASD currently have to adapt to our society and the challenges this entails. The aim is to generate empathy towards these individuals," as the authors of the project state.

Project 2 (2025): Roots of the Future (Figure 2)

Students: Pablo Bermejo, Laura Calvo, Noemí Rodríguez, Aymé Rodríguez, and Mercé Ros

"This study addresses the issue of urban transformation and the loss of green spaces, focusing on Mediterranean cities such as Valencia, where rapid urbanization and climate change have significantly impacted the ecological and social environment. The disappearance of the Huerta Valenciana and unplanned urban expansion have exacerbated phenomena such as urban heat islands, increased flooding, and biodiversity loss. Through a historical analysis and current research, the project identifies the environmental, social, economic, and public health implications resulting from the scarcity of green areas. It proposes viable solutions—such as reintroducing vegetation and improving urban design—to mitigate the effects of climate change and enhance urban quality of life. Furthermore, it highlights the relevance of these approaches for building resilient cities in the context of global warming," the authors say.

The uniqueness of this project lies in the fact that it emerged as a consequence of the devastating flood disaster that struck Valencia and its metropolitan area on October 28, 2024—resulting in 222 fatalities, 4 missing persons, 75 affected municipalities, and billions of euros in damages, along with an indelible psychological impact on the affected population. The indignation and frustration of those affected, and of the wider population, due to the incompetence and abdication of responsibilities by politicians at both regional and central levels, led to several mass demonstrations demanding accountability and the resignation of top officials.

The project was presented through a small installation in the form of a cube—simulating a house, a place of refuge—on the first floor of the school. The exhibition featured graphics, text and images created using ChatGPT and Midjourney, an editorial product, and 3D-printed objects that served as the diegetic elements to tell the story they had created.

DISCUSSION

The incorporation of novel and unconventional studies in art and design schools has been well received by the entire educational community, both faculty and students. At EASD Castelló, the introduction of new electives in an academic year is subject to voting and approval by the school's faculty. A preliminary proposal for the course is prepared, outlining its objectives, the competencies to be acquired by the students, the learning outcomes, and the evaluation criteria, with an argument for the benefits it brings to the teaching and learning process. These proposals are then evaluated, voted on, and approved by the school's teaching staff. *Futures Design* was unanimously approved the first time it was submitted.

At the end of each semester, quality surveys are administered to students in each course to detect deficiencies, gaps, and limitations in order to improve and provide quality public education. If an elective does not receive a good rating from the students and fails to meet minimum requirements, it is discontinued in the following academic year. In the case of this elective, the survey results have consistently been very positive, ensuring its continuation in the 2025–2026 academic year.

This course also serves as a space for collaboration among students from the different specializations offered at the school. The formation of multidisciplinary teams—with diverse approaches and perspectives—provides significant enrichment for the students (as reflected in surveys and personal comments, particularly in an independent survey I conducted aside from the official one administered by our institution). I strive to establish a relationship with my students based on closeness and trust, presenting myself as an accessible person who can help them achieve certain goals, rather than as an authoritarian figure in a hierarchical structure. This approach creates an ideal environment for gathering honest feedback directly from the students, which is essential for identifying and improving aspects that may be lacking, ensuring that the knowledge, attitudes, and skills they acquire are of quality and value.

Quantitative surveys conducted with both students and faculty indicate that students have very positively appreciated the novel approach of the course—even if they initially found it challenging to visualize future scenarios and to adapt to a methodology different from the conventional Double Diamond (Design Council) used in most project courses. Over 80% of the class values the opportunity to work with peers from different specializations, as it provides them with completely different perspectives (one of the course's objectives). As suggested

improvements, students indicated in the surveys that they would like to see extended time dedicated to AI or a longer period for project development.

Among the faculty, with a 60% participation rate, the results are also positive. About 63.2% were aware of the existence of the course, and 96.3% consider such transversal courses interesting and valuable for our students. While half of the faculty is familiar with design fiction, the other half is not; nearly 20% learned about the course through student feedback, and importantly, over 96% believe it is essential to incorporate social aspects into the curriculum.

CONCLUSIONS

In light of the results obtained, we can conclude that the implementation of the “Futures Design” course at EASD Castelló has proven to be highly satisfactory for both students and faculty. The surveys reflect that, despite the initial challenges in adapting to unconventional methodologies—as opposed to traditional approaches such as the Double Diamond—the students value the innovative and interdisciplinary nature of the course very positively, particularly appreciating the enrichment derived from working with peers from different specializations. Likewise, the majority of the faculty members recognize the importance of integrating social aspects into the curriculum, and see these transversal courses as key to developing critical thinking and fostering innovation in design. Although areas for improvement have been identified—such as extending the time dedicated to emerging topics like artificial intelligence and project development—these findings underscore the transformative potential of the course and its significant contribution to the comprehensive education of future designers.

2.2. Images

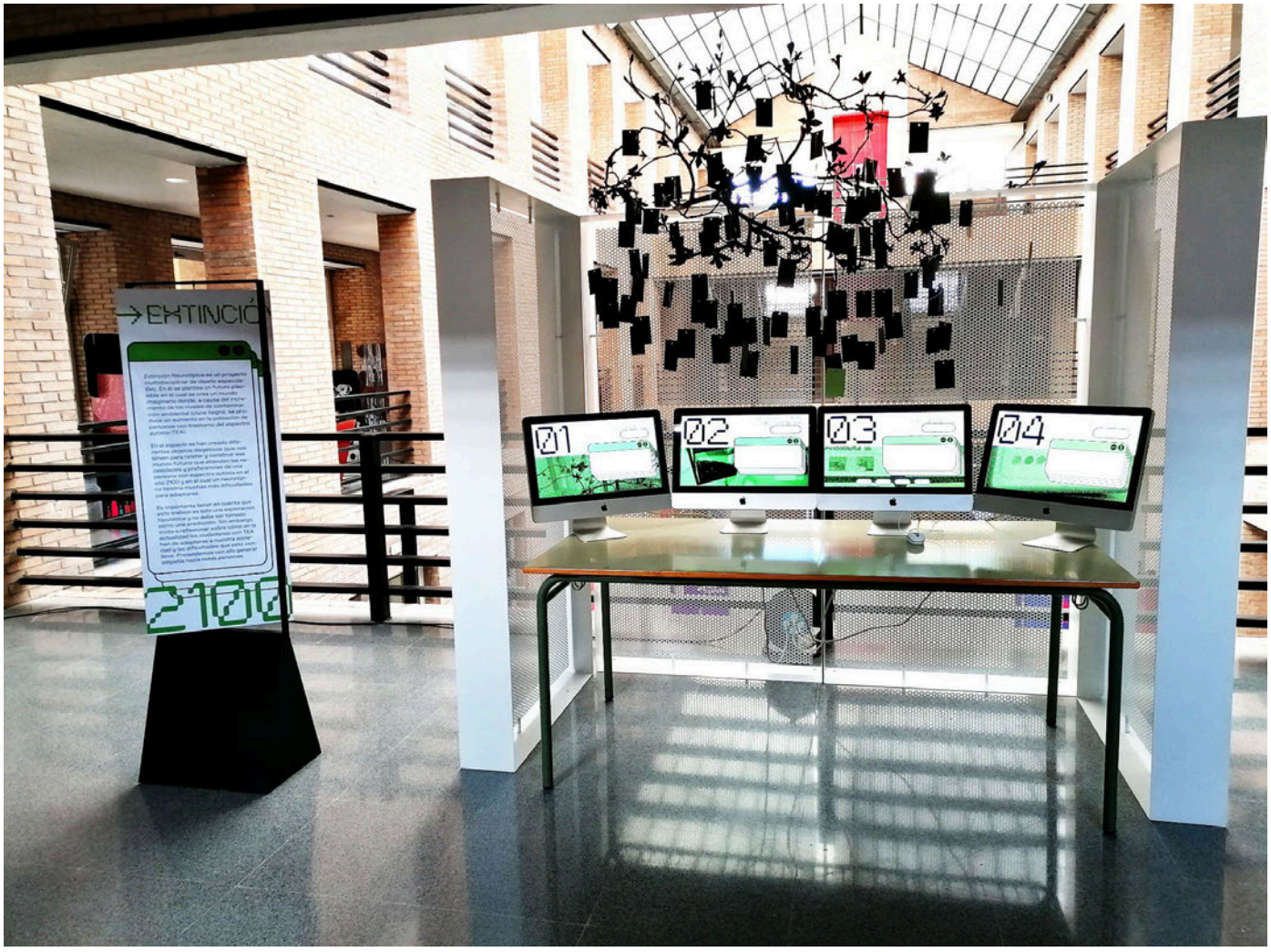

Figure 1. Project 1 Presentation: Neurotypical Extinction. 2022. Elisa Giustacchini (Erasmus), Victoria Monleón Beltrán, Luna Ramírez Alcoceba, and Isabel Salas Pérez

Figure 2. Project 2 Presentation: Roots of the Future. 2024. Pablo Bermejo, Laura Calvo, Noemí Rodríguez, Aymé Rodríguez, and Mercé Ros

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AIGC-integrated Platforms and Interior Design Workflow

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Introduction

- Since interior design has a complex process that demands significant time, effort, and expertise, the pursuit of design automation has never ceased. The evolution of interior design has been shaped by technological advancements from hand-drawing to Computer-Aided Design (CAD) and now Artificial Intelligence Generated Content (AIGC).
- While AIGC has enhanced efficiency and visualization, its application remains limited to text, image and video generation, lacking full integration into the design workflow.
- Current research focuses on AIGC as an assistive tool but has yet to explore its potential to automate and redefine design processes. With rapid AI advancements, AIGC is poised to evolve into an integrated platform capable of learning, analyzing, and generating designs autonomously. This transformation could fundamentally reshape interior design workflow, shifting AI from a supporting tool to an active creative agent, bringing automated design closer to reality.

Methods

The methodology consists of four key components: **literature analysis**, **case study** about 3 periods, **technical feasibility analysis**, and **conceptual framework development**.

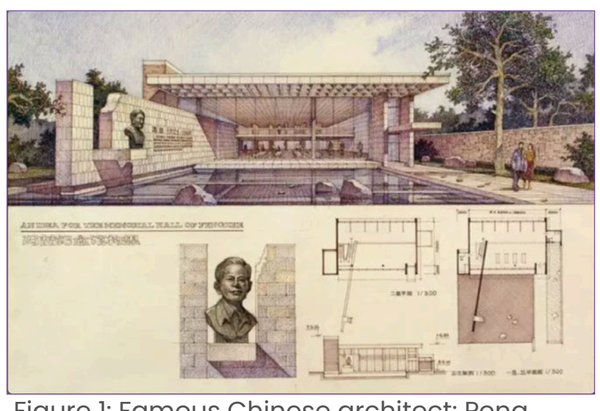

Figure 1: Famous Chinese architect: Peng Yigang hand-drawing design works

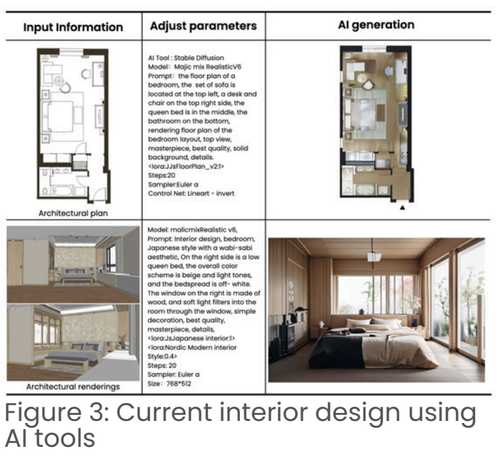

Figure 3: Current interior design using AI tools

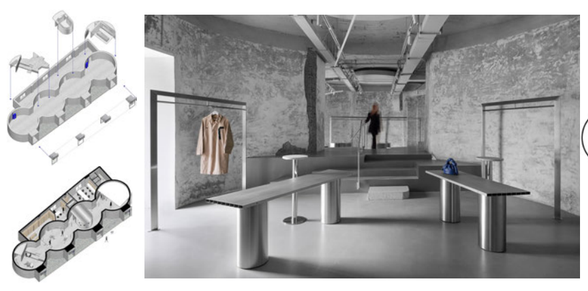

Figure 2: Interior design that use computers to model and render

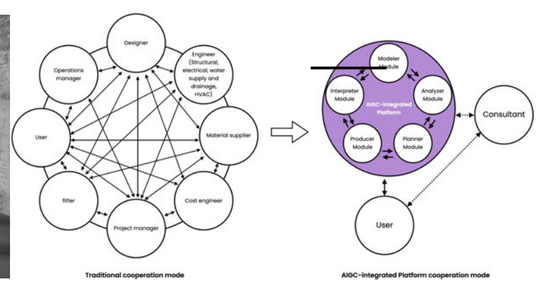

Figure 4: The comparison of traditional collaboration mode and future AIGC-integrated platform collaboration mode.

Discussion

This study aims to **propose the construction of AIGC-integrated platform** to realize automated design process.

- **Principal findings**: The AIGC-integrated platform enhances design automation by combining real-time feedback and intelligent recommendations, redefining workflows, human-AI collaboration, industry structures.
- **Limitations**: While promising, its implementation faces technical challenges such as computational demands, data integration and standardization, as well as ethical concerns including data privacy, fairness, and the evolving role of designers.

Conclusion

- This study explores the potential of an **AIGC-integrated platform** in interior design, outlining its functional requirements and proposing a **conceptual framework** composed of **interpreter, modeler, analyzer, planner, and producer modules** to enable **end-to-end automation** from design generation to operation.
- The platform fundamentally **transforming workflows** in interior design. Moreover, the **role of designers is being redefined**, as AI increasingly assumes creative tasks. Designers will evolve into **creative contributors**, who expand AI's learning database, **implementers**, responsible for translating AI-generated designs into reality, and **consultants**, facilitating user-AI interactions.
- This shift will make design services more **personalized and adaptive**, accelerating the transition to **intelligent automation**. However, achieving a **sustainable and equitable** AIGC adoption requires balancing **technological advancements with ethical considerations**, ensuring fairness, transparency, and meaningful human involvement throughout its development.

Results

The following **results** are obtained:

Key Finding 1: Explore the **characteristics** that the future AIGC-integrated platform should achieve: universality and intuitive interaction, dynamic information capture and real-time update, automated generation and multi-party collaboration, compatibility and scalability, ethics and data security.

Characteristics of AIGC-integrated Platform	• Universality and intuitive interaction
	• Dynamic information capture and real-time update
	• Automated generation and multi-party collaboration
	• Compatibility and scalability
	• Ethics and data security

Figure 5: The characteristics of AIGC-integrated platform.

Key Finding 2: Based on the above assumptions, the basic **conceptual framework** (interpreter module - modeler module - analyzer module - planner module - producer module) and operation mode of the AIGC integration platform are proposed.

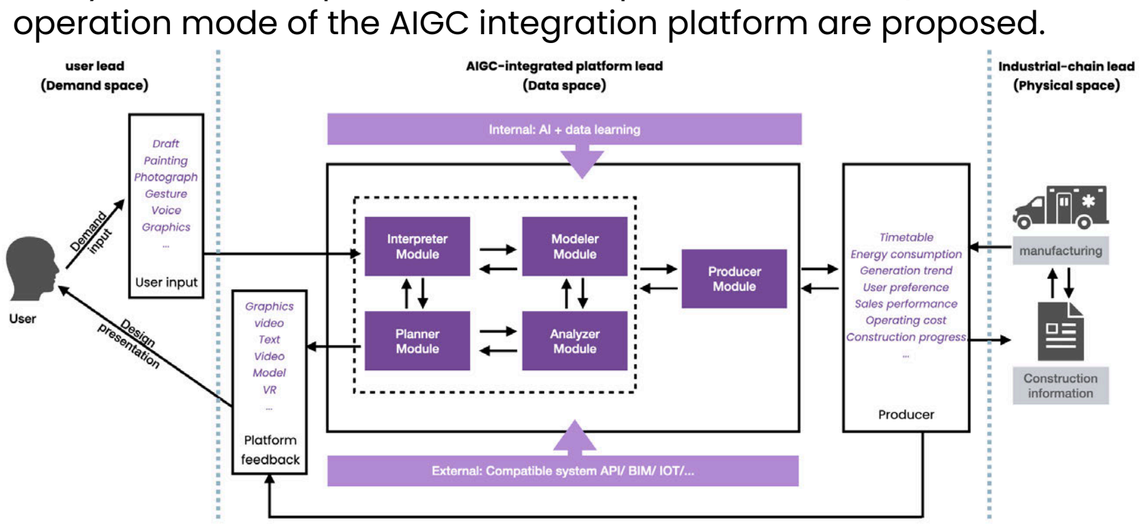

Figure 6: The conceptual framework of AIGC-integrated Platform.

Key Finding 3: The application of the AIGC-integrated platform has redefined the role of designers, as creative work is increasingly undertaken by AI, making humans no longer the central focus of design tasks. **The role of designers** is divided into **three** categories:

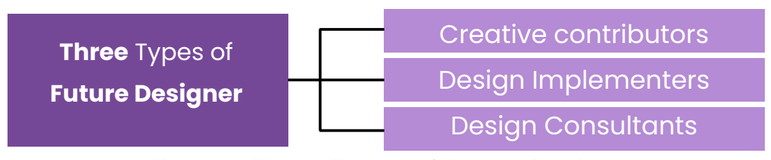

Figure7: Three Types of Future Designer

- **Creative contributors:** Expanding AI learning databases and driving creative exploration.
- **Design Implementers:** Responsible for the practical implementation and technical refinement of AI-generated designs.
- **Design Consultants:** Assisting users in interacting with AIGC-generated platform and optimizing the generated designs.

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Algoprax, a serious game to bridge the gap between A.I. and practice

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Abstract:

In this research-through-design project, a serious game, *Algoprax*, is developed to start bridging the **gap between practice and A.I. use**. Indeed, in many domains today (e.g., journalism, policymaking), mismatches between the way professionals usually get on with their job and how they use A.I. can be observed.

Building on **Engeström**'s (1987) Cultural-historical activity theory, *Algoprax* addresses A.I. issues spanning across four areas (i.e., tools, community, rules, division of labor). It aims at triggering stimulating conversations between players, so they identify frictions that relate to this gap, then start acting on it. For instance, insights collected during the play can be leveraged to set up A.I. norms and policies, like the codes of conduct mentioned in the EU's A.I. Act. *Algoprax* can also be used to improve participants' **A.I. literacy skills**.

Algoprax was evaluated among the author's expert colleagues to assess its strengths and limitations regarding industry deployment. It is seen as being efficient for revealing frictions between practice and A.I. use, as well as for educating participants. That said, it fared slightly lower when it comes to being perceived as a catalyst for change. Real-world testing would help improve the game's evaluation.

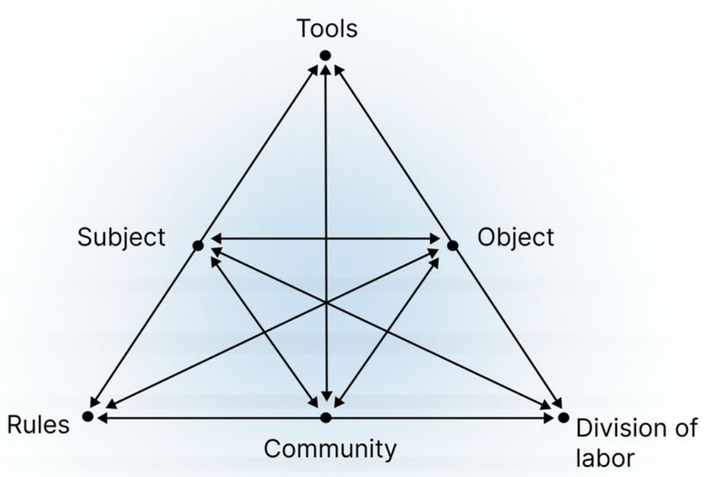
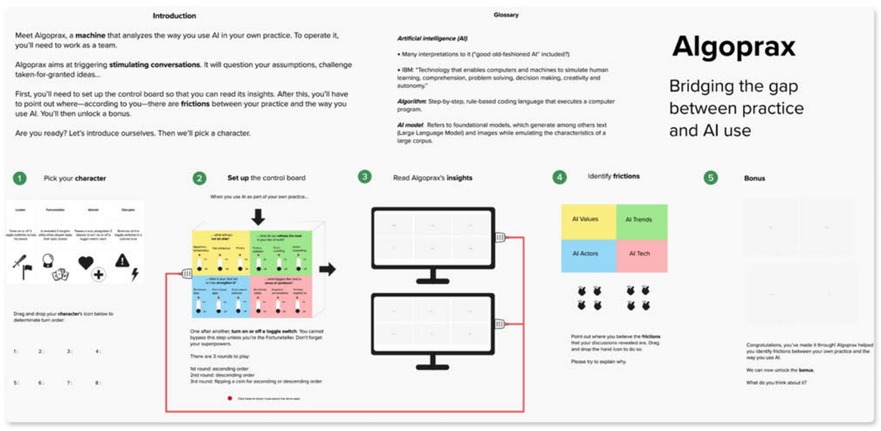


Figure. *Algoprax* builds on Engeström's model of an **activity system**. In this representation, each node mediates the activity's realization and are connected to each other.

Reference. Engeström, Yrjö. 1987. Learning by Expanding: *An Activity-Theoretical Approach to Developmental Research*. Helsinki: Orienta-Konsultit.

Deliverables: Scientific preprint, virtual prototype, news article

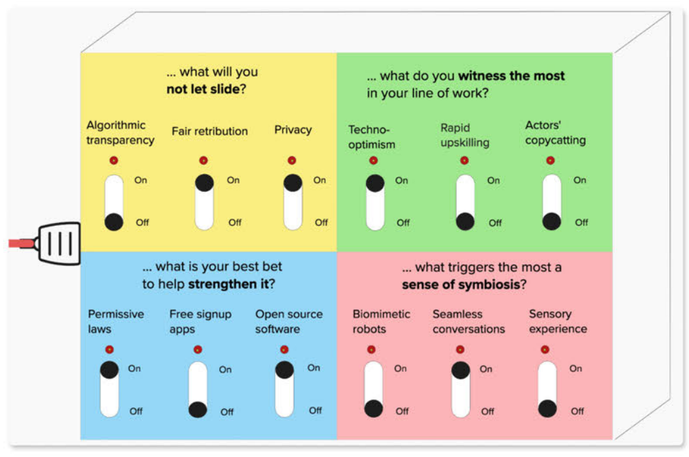
Storyboard of *Algoprax*'s game mechanics



Overview

The game's virtual board looks like that of a physical boardgame. At the top, *Algoprax* is introduced as a **fictitious machine** that players need to operate. A glossary also explains A.I.'s most frequent technical terms.

The machine part can easily be spotted in the bottom center of the board. During the play, participants turn on or off (one at a time) toggle switches on a control board, depending on whether they agree with a statement. *Algoprax*'s own interpretation will then be displayed on two screens.

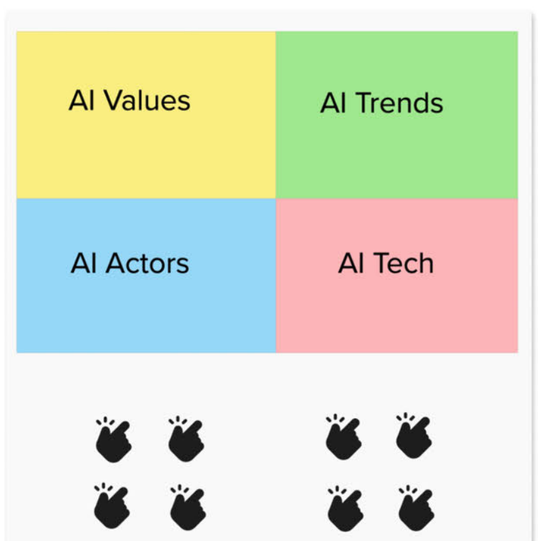


2. Setting up the control board

Algoprax's control board is divided in four colored areas, each with a question that pertains to the gap between practice and A.I. use. Under the question, three toggle switches can be turned on or off, depending on whether players agree with a statement. This reflects considerations mentioned in philosophical and sociological assumptions.

In each of the three rounds (with turn order set evenly), players have to **turn on or off a toggle switch**, even if this undoes another player's move. They also make use of their character's superpower. Initially, all the switches are turned off.

The goal is to **stir up conversations** among participants.



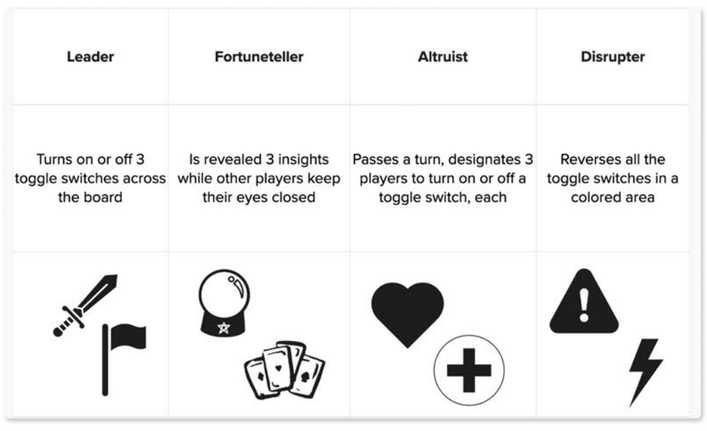
4. Identifying frictions

Following their exchanges, players are asked to identify where they believe **there is the most fictions** between practice and A.I. use.

They each move a finger into one of four colored areas, which reflect the themes already covered.

They try to voice their opinion while doing so.

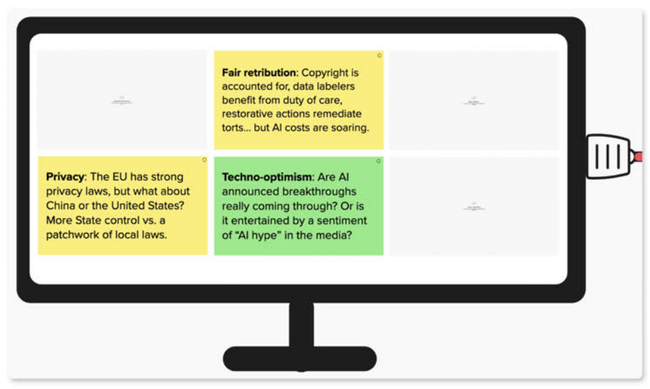
- Approximate length: 1.5 hour
- Number of players: 4 to 8
- Involves a moderator and a "scribe" to note down participants' exchanges (also possible to record without a scribe if workshop held online)



1. Picking a character

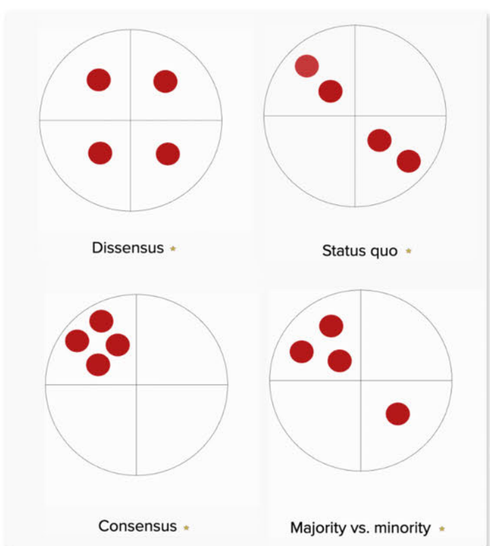
Before operating *Algoprax*, participants select a character. Each yields a "superpower" that can only be played once:

- the **Leader** turns on or off three toggle switches at once;
- the **Fortuneteller** asks the moderator to reveal three of *Algoprax*'s interpretations (while other players keep their eyes closed);
- the **Altruist** passes a turn and designates three players to turn on or off one toggle switch each;
- the **Disrupter** reverses all the switches in a colored area.



3. Reading insights

Once the control board is set, for each toggle switch, *Algoprax*'s interpretation is displayed as a **card on a screen**. Each card bears a text that startle participants so it triggers discussions between them.



5. Revealing bonus

To give participants the sentiment of closing the game—and also to reward them for their efforts—a **bonus is revealed** at the end of the play.

It takes the form of a diagram thought of by two of the author's colleagues. It provides a situational analysis (i.e., *dissensus*, *status quo*, *consensus*, *minority versus majority*) based on the fingers' positioning.

Participants share their thoughts before leaving the game.

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Bridging the Gap in Understanding AI Service Terms and Conditions

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ABSTRACT | As AI technologies integrate into various industries, they are reshaping user interactions—often without users' full awareness. Unlike traditional digital services, AI systems operate on vast, dynamic datasets, yielding unpredictable outcomes even for their creators. This unpredictability has sparked global debates on ethical and regulatory standards, especially regarding transparency and user consent. Despite AI's prevalence, many users remain unclear about its functionalities, data practices, and broader implications, frequently placing implicit trust in service providers.

A major challenge in AI governance is the complexity of Terms and Conditions (T&Cs) that regulate data collection and consent processes. Users often view these T&Cs as mere legal formalities, while providers fail to design them for optimal user engagement. This issue is critical in AI services, where ongoing consent is essential for continuous data processing.

This study uses a mixed-methods approach to assess and improve the accessibility of AI-related T&Cs. It involved a comparative analysis of existing agreements, development of a new framework incorporating Privacy by Design (PbD), Human-Centered AI (HCAI), and Explainable AI (XAI) principles, and a user study with 104 participants. Findings reveal that structured layouts, visual aids, and simplified language greatly enhance clarity, transparency, and usability, turning T&Cs into effective trust-building tools.

KEYWORDS | Human-Centered AI (HCAI), Privacy by Design (PbD), Explainable AI (XAI), User Consent and Transparency, Terms and Conditions (T&Cs)

1. Introduction

The advent of Artificial Intelligence (AI) has revolutionized modern services through personalized experiences and efficient data processing, yet it introduces significant privacy challenges. While AI systems leverage user data to enhance service quality and engagement, they face critical issues regarding data misuse, unclear management practices, and consent.

Terms and Conditions (T&Cs) currently serve as the primary framework for regulating AI data usage and building user trust. These agreements establish legal parameters by defining service boundaries and outlining rights and responsibilities. However, traditional T&Cs often fail in their fundamental purpose: helping users understand service terms. Many organizations treat these agreements as mere legal formalities rather than opportunities for meaningful user engagement. This challenge is particularly acute in AI services due to their "black box" nature and complex data networks. Users frequently encounter lengthy, technical documents that obscure rather than clarify data usage practices. This leads to passive consent without genuine understanding, creating a gap between perceived transparency and actual user awareness.

Several frameworks offer potential solutions, including Privacy by Design (PbD), Human-Centered AI (HCAI), and Explainable AI (XAI). These structured approaches enhance T&Cs through improved transparency and user awareness. When integrated effectively, these principles help users better understand data usage while maintaining compliance with evolving regulations like GDPR.

Looking ahead, T&Cs must evolve beyond their current form to address AI systems' unique challenges. Rather than serving as passive agreements, they should transform into transparent frameworks that empower users to make informed decisions about their data.

2. Understanding Design Ethics in AI

2.1. The Evolution and Relevance of Design Ethics in the Digital Age

Design ethics has evolved from its formal inception to become a crucial framework for addressing modern challenges, particularly in digital technology. Founded on principles of responsibility, inclusivity, and sustainability, it provides essential guidance for tackling issues of privacy, transparency, and user autonomy.

The field emerged from the understanding that design actively shapes society rather than being neutral. Victor Papanek's seminal work "Design for the Real World" (1971) redefined design as a moral endeavor, emphasizing societal and ecological responsibility. His vision has expanded to address contemporary concerns including data sovereignty and AI ethics.

These principles extend beyond physical products to encompass systems and processes that influence social behavior. This broader perspective is particularly relevant for AI and digital services, where ethical considerations around privacy, algorithmic transparency,

and equitable access are paramount.

2.2. Differences Between AI Services and Traditional Computing Systems

The shift from human-computer interaction to human-AI interaction introduces additional complexity. AI systems employ opaque, bottom-up learning methods, creating a "black box" effect that makes it difficult for users to understand how their data is processed. This lack of transparency hinders informed decision-making when accepting T&Cs.

AI services require massive datasets to function effectively, unlike traditional systems that need minimal personal data. This dependency raises significant privacy concerns, especially when T&Cs fail to adequately disclose data collection methods and usage purposes. The situation is further complicated by ethical issues such as algorithmic bias and non-transparent decision-making processes.

2.3. The Relationship Between Privacy, Intellectual Property (IP), and Design Ethics

The development and deployment of AI technologies face IP concerns which focus on who owns datasets and how training data consent is managed. Design ethics requires systems to transparently disclose data practices and user rights concerning both inputs and outputs.

Design ethics establishes a framework which manages the competing interests involved. AI design that follows ethical principles prioritizes fairness and accessibility and maintains accountability standards while upholding both user autonomy and societal values. Interfaces need to enable users to make informed decisions through clear presentations of privacy impacts and intellectual property limits.

Embedding privacy safeguards and intellectual property considerations into AI development minimizes system abuse while building user trust through ethical engagement.

3. Challenges in Ethical T&Cs for AI Services

3.1. Challenges of Terms and Conditions

T&C documents are often written in dense legal language, prioritizing legal protection over user understanding. This complexity leaves users unclear about their rights and obligations, undermining the purpose of T&C as tools for transparency and trust (Krumay & Klar, 2020). Users encounter T&C agreements frequently, leading to a dismissive attitude where they consent without reading or understanding the terms (Laird, 2022). This routine acceptance diminishes informed consent and disconnects users from the document's intended purpose.

Privacy literacy also varies significantly among individuals, influenced by cognitive abilities and personality traits. Users with lower crystallized intelligence often struggle with complex privacy policies, particularly in AI services, where "black box" systems obscure how data is collected and processed (Sindermann et al., 2021). The opaque nature and vague definitions of AI-driven T&C further erode trust, as service providers often conceal intentions like data monetization, making it harder for users to navigate these terms effectively.

3.2. Ethical Dilemmas in Balancing Corporate Interests and User Rights

Service providers frequently present themselves as neutral intermediaries within their Terms and Conditions (T&Cs), thereby eschewing accountability for the ethical and legal ramifications of their AI systems. As elucidated in Consent for All: Revealing the Hidden Complexity of Terms and Conditions, this ostensible neutrality not only undermines transparency but also reallocates significant risks, particularly intellectual property (IP) issues, onto the user. A critical concern emerges when providers train their AI models using works produced by artists or content creators without securing proper licenses or obtaining explicit consent. Consequently, users may inadvertently utilize AI-generated outputs that infringe upon IP rights, thus navigating a legally ambiguous terrain. Although providers benefit from enhancing their AI capabilities through such practices, they typically deflect responsibility for potential IP infringements, effectively transferring the legal burden to the user.

Furthermore, the opacity of T&Cs exacerbates this issue, as these documents seldom disclose the provenance of training data or articulate the attendant legal risks. To redress these challenges, it is imperative that service providers reformulate T&Cs to assume responsibility for ensuring compliance with IP laws and to transparently communicate any indemnification provisions or limitations on usage. Such measures are essential to fostering a more balanced and equitable digital ecosystem.

4. Designing Transparent and Accessible T&Cs

4.1. The Importance of PbD, XAI, and HCAI in T&Cs Design

Developing Terms and Conditions (T&Cs) for AI services which focus on users needs a framework that puts privacy protection along with transparent operations and accessible information at the forefront. Three essential principles guide this process: The three guiding principles essential to developing user-centric Terms and Conditions for AI services are Privacy by Design (PbD), Explainable AI (XAI), and Human-Centered AI (HCAI). Privacy by Design (PbD) requires system architects to integrate privacy protections which manage data collection and sharing processes while complying with rules such as GDPR and CCPA. XAI enables transparency through clear explanations of AI system operations and data handling that users can easily access. This process leads to informed user consent while reducing worries about hidden data activities. HCAI works to make AI systems reflect human values while creating understandable T&Cs for users regardless of their technical expertise. These integrated principles establish strong T&Cs which build user trust while safeguarding rights and fulfilling ethical standards and regulatory obligations. A holistic strategy delivers fairness while establishing a durable base for

reliable AI engagements.

4.2. Combining Design Ethics Principles with Practical UX Design Framework

The proposed thesis framework combines Jesse James Garrett's Elements of User Experience with Privacy by Design (PbD), Human-Centered AI (HCAI), and Explainable AI (XAI) principles to develop transparent and user-centered Terms and Conditions (T&Cs) that adhere to design ethics standards.

1. **Strategic Alignment**: The revised terms of use were structured to enhance user trust by clearly communicating
- Data privacy policies, user rights, and AI system transparency.
- The mechanisms behind AI-generated outcomes based on user input.
- User control over personal data and interactions with the system.
2. **Scope and Structure**
- Users were given the ability to pre-set their level of understanding before navigating the terms, allowing for progressive disclosure and simplification of legal content.
- Readability was optimized by adjusting content to a medium-to-low difficulty level, measured using the SMOG readability index, to reduce cognitive burden and improve comprehension.
3. **Layout and Interaction Design**
- A redesigned navigation system incorporated visual aids, including icons, to enhance engagement and facilitate information retrieval.
- Headings and key sections were highlighted and spaced with larger margins to improve readability and quick reference.

5. Case Study

5.1. Methods

A comparative analysis of user interactions with the original and revised versions was conducted to assess improvements in comprehension, satisfaction, and trust. The redesign process was guided by core principles from Privacy by Design (PbD), Human-Centered AI (HCAI), and Explainable AI (XAI) to enhance accessibility and transparency.

5.2. Research Design

This study employed a mixed-methods approach to evaluate user perceptions of AI-related Terms and Conditions (T&Cs) and assess the effectiveness of a redesigned, user-centered framework. The research was conducted in three key phases: (1) Evaluation of existing AI T&Cs, (2) Development of an enhanced framework, and (3) User testing through a structured survey.

1. **Evaluation of Existing AI T&Cs**

   A comparative analysis(Table 1) was conducted on the T&Cs of five major AI platforms to identify common usability barriers, lack of transparency, and engagement issues. The analysis focused on readability, structure, visual presentation, and content comprehensiveness, with particular attention to how AI services disclose data collection, user rights, and consent mechanisms.

Table 1. An analysis of T&Cs from five AI platforms by framework

	OpenAI ChatGPT	Midjourney	Google Gemini	MS Azure	IBM Watsons
Contents	OpenAI emphasizes user-focused design by promoting data privacy and control over content (PbD), aligning AI systems with human values through clear documentation (HCAI), and offering general service documentation while lacking detailed model-level explanations (XAI)	MidJourney supports user creativity by providing artistic tools that augment human work without replacing it (HCAI), includes basic data privacy terms but with limited PbD formalization, and offers outputs with minimal transparency regarding underlying model decisions (XAI).	Google Gemini integrates user control over data to ensure data protection (PbD), prioritizes human well-being and collaborative input to refine AI models (HCAI), and strongly focuses on AI interpretability to explain decision-making processes clearly (XAI).	Azure explicitly adopts Privacy by Design with robust user data controls (PbD), emphasizes fairness, transparency, and removing biases in AI systems (HCAI), and incorporates detailed explanations of AI outputs to support interpretability (XAI).	IBM embeds Privacy by Design in its AI services with strong user data controls (PbD), develops AI systems to augment human decision-making and prioritize assistance over replacement (HCAI), and highlights Explainable AI principles to ensure users can trace and interpret decision-making in its Watson services (XAI).
SMOG*	14.39	15.72	19.53	18.50	21.24
Layout	Minimalist with clear sectioning and sufficient spacing for readability. A neutral background ensures focus remains on the text. The layout is simple and professional.	Clean, sparse, and distraction-free. Sections are segmented with concise headers, designed for a straightforward, scrollable format.	Incorporates Google's Material Design principles, with ample white space, bold headings, and collapsible sections (accordion-style) to organize content. This layout facilitates easier navigation of lengthy documents.	Professional and corporate, designed with enterprise users in mind. Features large headers and drop-down menus for segmenting dense content. Hyperlinks to related documents are used for further depth.	Structured and formal, catering to enterprise customers. The layout uses clear sections, bulleted lists, and headings for improved readability.
Elements	The T&Cs prioritize clarity and professionalism but lack engaging features like visual aids or interactive tools. The absence of icons and diagrams limits user engagement.	While the simplicity aids readability, the lack of icons, diagrams, or interactive tools limits the page's ability to visually communicate complex terms or engage users.	The T&Cs integrate expandable menus and visual navigation aids, improving user interaction and comprehension. However, the lack of diagrams limits the visual explanation of complex terms.	The T&Cs include drop-down menus for improved navigability and hyperlinks for additional resources. The use of subtle icons adds a professional touch but does not strongly engage users visually.	The T&Cs prioritize precision and clarity with structured formatting, such as headers and bullet points. However, the lack of interactive or visually engaging features limits accessibility for non-enterprise users.
Text	Heavily legal and text-based, with a focus on clarity. Sections are clearly divided by headings and subheadings, but minimal use of bold or highlighted text reduces emphasis on key points.	Concise and simple, with brief descriptions of each point. Occasional bold text is used for emphasis, but overall typography is plain and functional.	Well-organized with clean fonts. Key sections and phrases are emphasized using bold text or color highlights, improving scannability.	Highly detailed and technical. Large, bold headers and smaller subheadings create a clear hierarchy, aiding navigation. Text is dense but structured for enterprise-level clarity.	Detailed and technical, targeting professional users. Headers and bullet points are extensively employed to break down dense content.

Icons/Images	None observed.	None observed.	Rarely included. Minimal icons for navigation.	Rarely included Minimal icons are used to categorize documents.	None observed.

2. **Development of the Enhanced Framework**

   Based on the insights from Phase 1, a user-centered framework was developed. The framework was designed to simplify legal language, incorporate visual aids and structured layouts, and introduce adaptive elements tailored to different user literacy levels. (Figure 1)

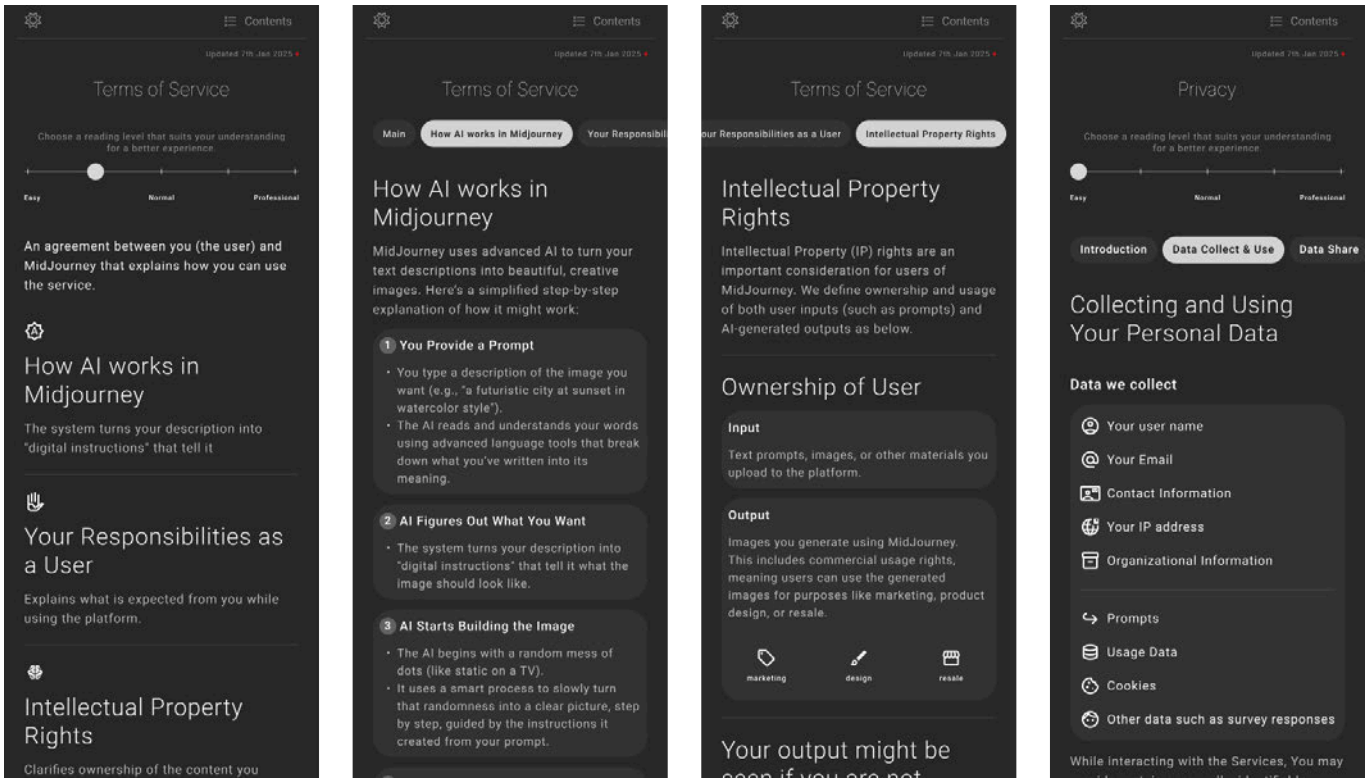

Figure 1.Redesigned T&Cs of Midjourney

3. **User Testing and Survey**

   To assess the effectiveness of the redesigned T&Cs, a structured survey was conducted with 104 participants from diverse backgrounds, including varying levels of AI familiarity. The survey measured user comprehension, engagement, and trust in the redesigned T&Cs compared to conventional versions.

5.3. Participants and Procedure

A total of 104 participants from diverse backgrounds took part in the study. Each individual was allotted 15 minutes to review both the original and redesigned T&Cs before completing a survey that measured understanding, engagement, and trust levels. The

survey combined quantitative rating scales and open-ended feedback to capture detailed insights into user perceptions.

5.4. Measures

Participants were presented with both the original and redesigned T&Cs and asked to evaluate them based on:

- Clarity: Ease of understanding legal and AI-related terms.
- Transparency: Perceived openness in data practices and AI decision-making.
- Engagement: Effectiveness of visual aids and structured layouts.
- Usability: Overall ease of navigation and accessibility.
- Cognitive Load: The mental effort required to process the document.

  A 5-point Likert scale (1 = Very Poor, 5 = Excellent) was used to quantify responses, supplemented by qualitative feedback to capture user insights.

Quantitative data were analyzed using descriptive statistics to compare user ratings of the original vs. redesigned T&Cs. Thematic analysis was applied to qualitative responses to identify common patterns related to user experience, trust, and perceived barriers to comprehension.

5.5. Results

The findings indicate that the redesigned Terms and Conditions (T&Cs) significantly enhanced the user experience across key dimensions, including clarity, usability, engagement, and cognitive load reduction.

1. Clarity and Accessibility

   The redesigned T&Cs significantly improved clarity and ease of understanding, achieving a mean rating of 4.12 (SD = 0.82) compared to 3.13 (SD = 1.24) for the original version. Participants identified clear section headings, simplified language, and structured layouts as key factors contributing to this improvement. Additionally, 43.3% of respondents highlighted "clear visual design and layout" as the most helpful aspect in improving comprehension.

2. The addition of icons, diagrams, and highlighted sections played a crucial role in enhancing user understanding. 49% of respondents found visual aids "very helpful," while 44.2% rated them "extremely helpful." These enhancements reduced cognitive load, improved information retention, and facilitated

navigation. Furthermore, 64.4% of participants reported a notably better reading experience (Figure 2).

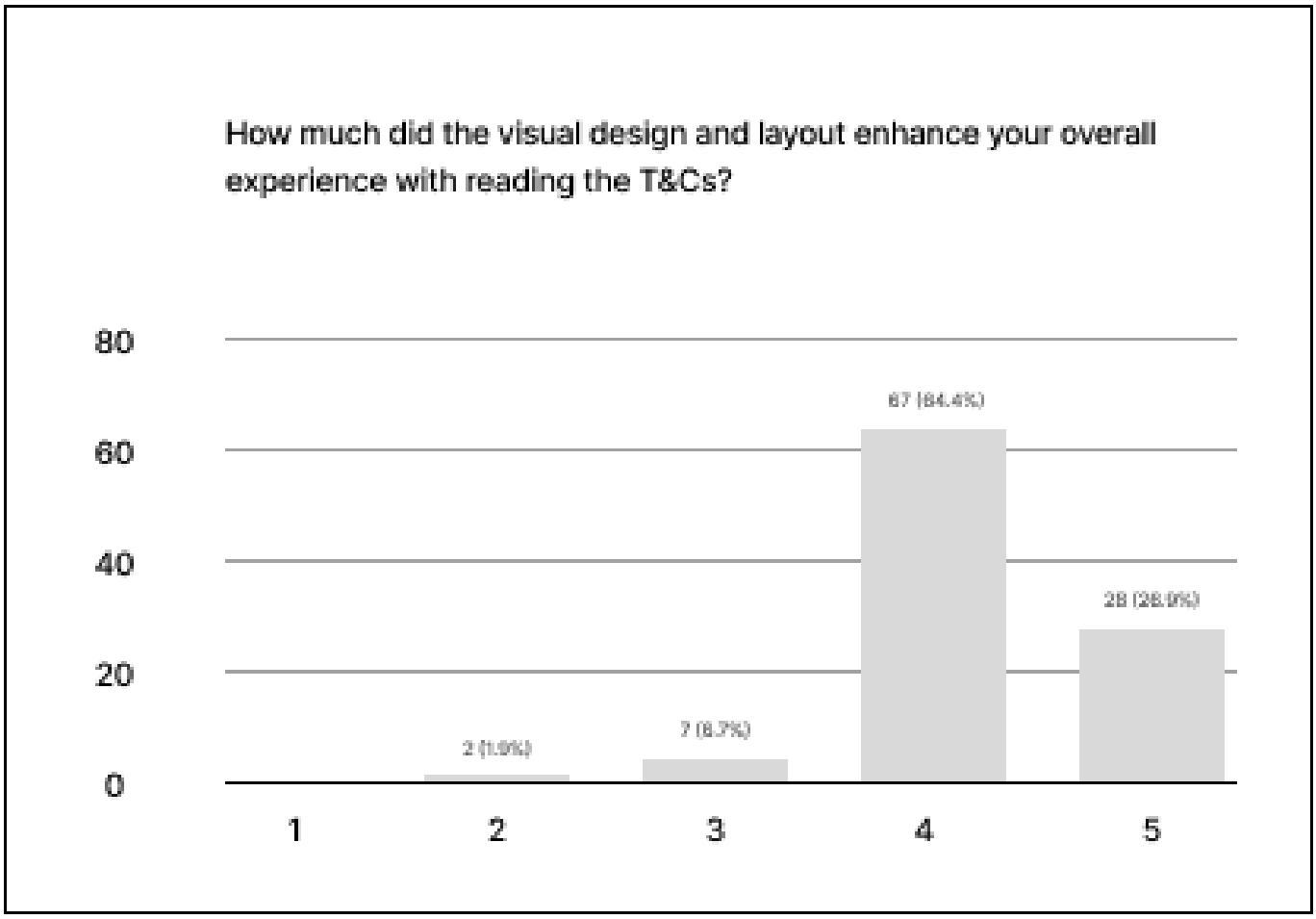

Figure 2.Impact of Visual Design and Layout on User Experience with T&Cs

3. Usability and User Satisfaction

   User ratings for usability(figure 3) also showed substantial improvement, with the redesigned T&Cs receiving a mean score of 3.63 (SD = 1.30) compared to 2.90 for the original version. Participants appreciated the logical structure, improved readability, and user-friendly flow of information, particularly the balance between simplicity and comprehensiveness.

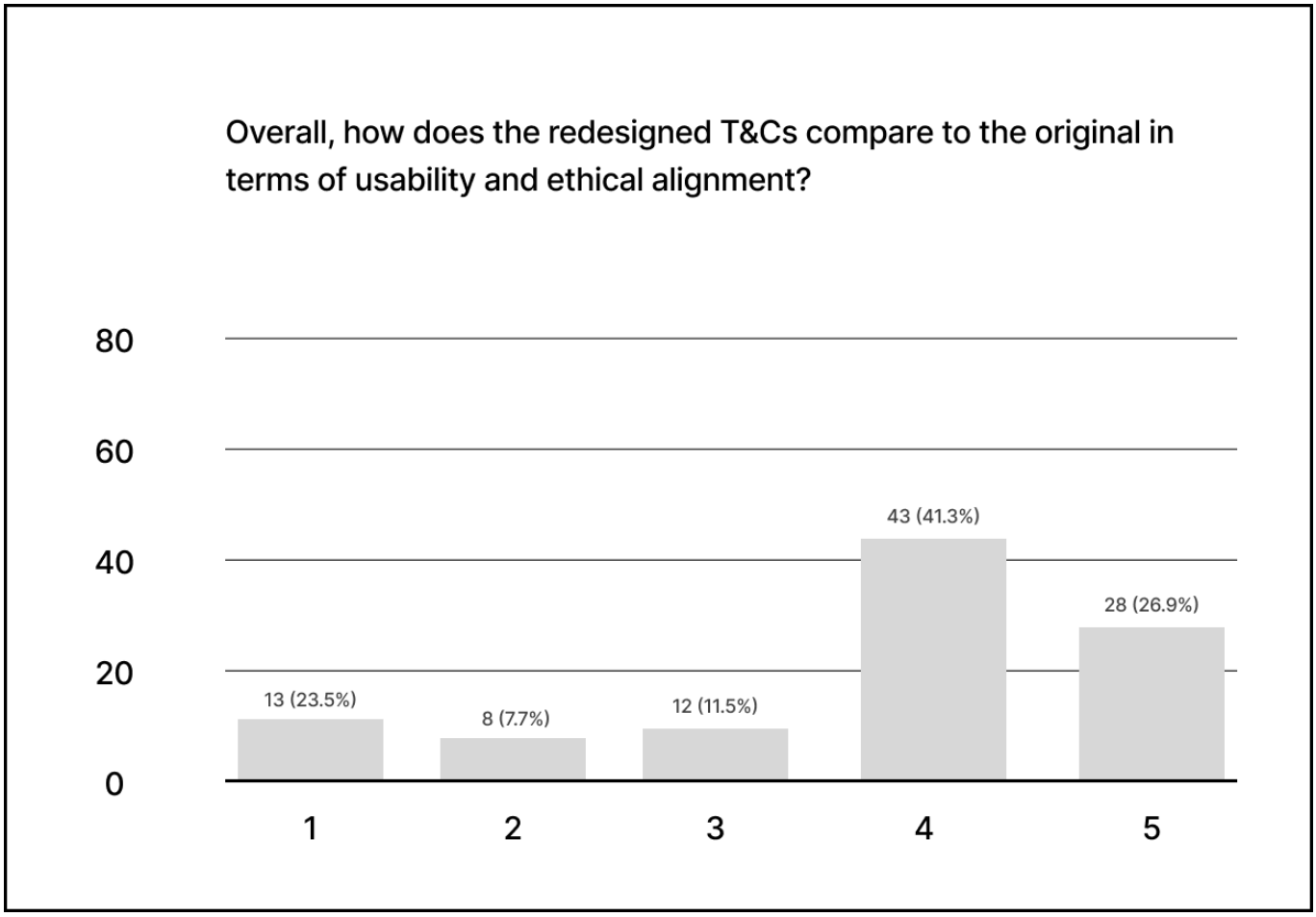

Figure 3. Comparison of Usability and Ethical Alignment Between Original and Redesigned T&Cs

4. Cognitive Load Reduction

   The redesigned T&Cs effectively reduced cognitive strain, receiving a mean score of 4.16 (SD = 0.62) compared to 3.20 for the original version. The integration of structured layouts and customizable elements minimized the mental effort required for users to navigate and comprehend key terms.

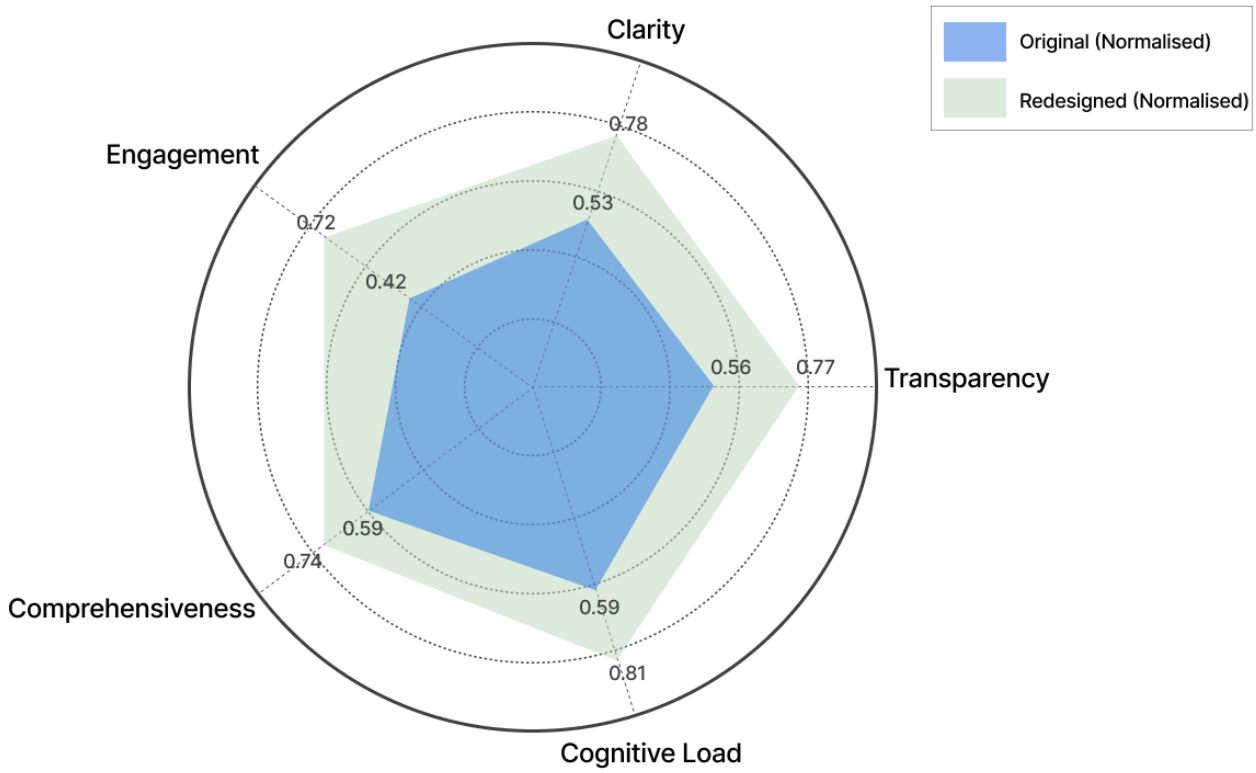

Figure 4. Comparison of original and redesigned T&Cs (Normalised)

These findings(Figure 4) underscore the importance of user-centered design in AI service agreements, ensuring that policies are clear, accessible, and easy to engage with while fostering trust and transparency in digital governance.

6. Discussion

While the framework provides a foundation for human-centered T&Cs, it is not without challenges. One significant issue is the dynamic nature of AI systems, which makes it difficult to keep terms and conditions (T&Cs) updated to accurately reflect evolving functionalities and features. Additionally, the redesigned Terms and Conditions (T&Cs) didn't incorporate every standard element normally found in such agreements. The document prioritized enhancing clarity and user engagement but as a result some legal and technical details were not fully included which impacted the overall completeness. Future iterations need to investigate solutions that maintain complete contractual information while ensuring documents remain readable for users.

7. Future Directions

7.1. Empowering Users Through Optimised Terms

Service providers need to move away from unilateral communication systems towards approaches that prioritize cooperation and openness. Providers who allow users to tailor their terms of use can show legal information through formats that people can easily access and understand. Through this method organizations gain user trust alongside the

promotion of ethical design practices and fairness in digital platforms. The spread of AI services requires immediate attention to digital literacy disparities. Personalized legal documents which AI-driven adaptive Terms and Conditions generate match each user's comprehension level through simplified presentation. The adaptive methodology minimizes complex legal language so users stay informed and empowered which leads to a more equitable digital ecosystem centered around user needs.

7.2.Regulating Human-Centered T&Cs in AI Services

Regulations for AI services must extend past content rules to also focus on information presentation and verification methods. User interfaces need to utilize straightforward language together with visual emphasis on critical details and verification systems to ensure users understand information. GDPR and CCPA regulations address compliance but frequently ignore UX elements which affect user comprehension. Implementing UX guidelines for T&Cs closes the comprehension gap so users provide truly informed consent.

8. Conclusion

The research establishes an initial roadmap to improve how transparent and accessible AI service standards and results can be. This proposed framework connects user experience with AI ethics through structured T&Cs design which empowers users and maintains compliance with legal and ethical standards. The framework builds trust and engagement which aligns with legal standards and deals with broader ethical issues present in the evolving digital AI space.
This research supports the creation of transparent and accountable AI systems and joins existing studies that focus on designing AI technologies centered around human needs. The research shows how vital it is to build AI systems which focus on user comprehension together with ethical accountability and genuine consent throughout AI technology evolution.

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COMMUNICATION DESIGN EDUCATION FOR THE AI ERA: OBSERVATIONS FOR A RESPONSIBLE COLLABORATION WITH COMPUTATIONAL PARTNERS.

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ABSTRACT | The exponential evolution of artificial intelligence (AI) over the past 30 years has rapidly transformed it from an academic pursuit into a widely accessible technology with far-reaching effects across industries and creative practices alike. In this paper, while recognizing the inherent uncertainties of forecasting such rapid technological evolution, we aim to present a review of quantitative industry metrics and qualitative expert insights to provide the design community with a grounded basis for debate on the formative and professional shifts driven by AI.
Methodologically, the study employs a meta-review strategy, analyzing key industry reports, scholarly articles, and commentaries published over the past half-decade. From the thematic analysis of the collected sources, we extract recurring macro themes and contextualize general AI developments within the specific challenges and opportunities of Communication Design. The analysis unfolds in a structured progression: starting with an overview of the rapid evolution of AI technologies, it then explores the core characteristics of AI—particularly the shift toward generative models and example-based learning—and finally scrutinizes the practical challenges of control and collaboration between human designers and AI systems.
The first observation establishes AI's rapidly evolving role, bolstered by growing academic output, increased economic investments, and accelerated technological scaling. The second considers AI's rapid trajectory and the historical precedents for such a transformation, drawing parallels to earlier technological revolutions in design. The third observation analyzes AI's focus on pattern recognition and its tendency to reinforce the hegemonic perspective, posing risks of stereotyping and cultural convergence in visual

representation, challenging diversity and inclusivity in design. The fourth observation reflects on control, noting challenges designers face both in guiding AI toward nuanced creative intentions, and in training new models. The fifth observation reflects on the profound restructuring of design workflows as AI assumes roles traditionally held by designers, reflecting on the need for designers to take an active role in guiding these tools to ensure innovation and originality and on the skills and competences needed to steer intrinsically AI's imitative nature.
As a final contribution, the paper presents a hypothesis for education in design developed at the School of Design of Politecnico di Milano in the Communication Design degree program, advocating for an adaptive approach in design curricula, bridging humanistic insight with technological literacy to meet the demands of an AI-integrated creative landscape. The hypothesis presents a dual approach to design education founded on visual cultural literacy alongside technical expertise to equip future designers to critically engage with and direct AI technologies. This reflection aims to contribute to ongoing discourse on AI's implications within design, underscoring the responsibility of institutions like Politecnico di Milano to prepare future designers through updated pedagogical and professional frameworks in response to these technological transformations.

KEYWORDS | ARTIFICIAL INTELLIGENCE, COMMUNICATION DESIGN, DESIGN EDUCATION, DESIGN ETHICS

1. Introduction

In the past five years, advancements in Artificial Intelligence (AI) technologies have transformed what was primarily an academic research endeavor into a widely accessible technology, with tangible impact across various industrial sectors and a significant impact on practice and education in the discipline of communication design.

In the context of design research and related disciplines, the intersection of artificial intelligence and graphic design is an active area, with studies focusing on different aspects of its impact, such as its transformative potential (Stoimenova and Price, 2020; Song et al., 2022; Guzman and Lewis, 2020); its impact on creative methodologies and production practices (Serra and Miralles, 2021); its ethical and cultural issues and role of human oversight (Zhang et al., 2021; Gunkel, 2012); and the evolving role of the designer (Kwon et al., 2023; Afolabi et al., 2024).

In such a rapidly evolving context, while predicting the medium to long-term impact on visual and graphic design disciplines is a complex task subject to risks of oversimplification, this contribution aims to gather some observations on the current state, the emerging directions, the elements that seem to be critical elements for an informed discussion. With this aim, this paper presents a review that combines quantitative industry metrics with qualitative expert insights to examine the traits of current AI trends and their impact on design. The objective is to provide a founded base for debate in the design community with regard to the current and future formative and professional context.
While we acknowledge that even with a clear understanding of current technological developments, the implications of these changes with respect to the adjustments needed in didactics and education remain uncertain, we feel that defining a clearer picture of the current scenario can help reflect on the dimensions of change, if not on its specific modalities.

2. Methodology

This contribution is based on an analysis and meta-review of the main industry reports, commentaries, and literature addressing developments in AI in the last 5 years to provide a quantitative glimpse into the evolution of AI technologies, while also incorporating expert opinions to offer qualitative depth. From the collected literature, observations were extracted through thematic analysis in order to identify recurring macro themes and relate general commentaries to the disciplinary context of Communication Design.

The observations identified follow a structured progression, beginning with a broad technological perspective on AI, with limited reference to the disciplinary context, before gradually examining aspects critical to the context of Communication Design. While Artificial Intelligence is introduced in general terms, the primary focus is on Generative AI, and the mechanisms through which Machine Learning algorithms generate content.
The observations progress from the current state of AI (3.1, 3.2), through its fundamental characteristics (3.3), to its practical challenges (3.4), and finally its implications for design education and practice (3.5).
At the end of the contribution we share a first hypothesis, grounded in the available evidence, that represents an approach being tested at the School of Design of Politecnico di Milano in the Communication Design degree program, to frame and address such shifts in design practices.

3. Observations

3.1 A Context of Rapid Evolution

The starting observation, certainly obvious but not without relevant consequences, is that AI technologies not only represent a central reality in the current technological, cultural, and social landscape but also constitute a field characterized by continuous and rapid evolution. Data from industry reports and academic literature describe a context not only of growth that manifests across multiple interconnected dimensions but also of acceleration.

In the academic sphere, we see a remarkable intensification of scholarly attention and resource allocation. Publication volume on arXiv, an open-access platform for sharing scientific research, demonstrates exponential growth, doubling approximately every 23 months (Krenn et al., 2023), while citation patterns reveal AI-related works have increased from 5% to 20% of all computer science citations within a decade (Maslej et al., 2024). This academic expansion has catalyzed substantial institutional responses, evidenced by initiatives such as Horizon Europe's €95.5 billion allocation for 2021-2027 and a global tripling of AI-focused degree programs since 2017. Higher education institutions across both technological and humanistic disciplines have systematically integrated AI-specific curricula, responding to the growing demand for expertise in this rapidly evolving field (Maslej et al., 2024).

The industrial sphere presents an even more dramatic transformation. Industrial adoption of Artificial Intelligence demonstrates remarkable expansion across multiple indicators. Patent activity, predominantly driven by American and Chinese multinationals, has increased 31-fold since 2010 (Maslej et al., 2024), while organizational integration has reached significant levels, with 42% of large organizations having implemented AI solutions and an additional 40% actively exploring implementation (Alex Singla et al., 2024). This industrial momentum is particularly evident in design-adjacent sectors, where

generative AI investments witnessed an eight-fold increase in 2022, accumulating $25.2 billion in funding distributed among the companies pioneering advanced AI models and tools, such as OpenAI, Anthropic, Hugging Face, and Inflection. The expansion extends beyond corporate boundaries, encompassing both established technology companies—exemplified by Google's biannual doubling of internal AI projects (Young, 2018)—and the open-source community, where GitHub's AI-related projects have grown from 845 in 2011 to approximately 1.8 million in 2023, accompanied by a tripling of community engagement between 2022 and 2023 (Maslej et al., 2024).

The technological infrastructure supporting Artificial Intelligence has experienced unprecedented growth, with computational resources—such as processing power, specialized hardware, and data storage—allocated to AI training expanding at an annual rate of 400-500% over the past decade. This growth trajectory has remained consistent across various model architectures, particularly in generative systems including Large Language Models, image synthesis, and multimodal systems (Sevilla & Roldán, 2024). The convergence of expanding computational capacity, enhanced algorithmic efficiency (Ho et al., 2024), and sustained investment (Cottier et al., 2024) has facilitated the development of increasingly sophisticated models.
This increased sophistication can be observed in two main areas: dataset size and model complexity. Datasets—the collections of examples AI models use to learn—have grown significantly, reaching sizes of 2 trillion tokens (individual pieces of text, such as words or fragments) for language models, and 3 billion images for visual systems (Villalobos et al., 2024). At the same time, the complexity of these models has grown rapidly, with the number of parameters—the internal adjustable settings that determine how a model processes information—doubling every 8 months for language models and every 12 months for image recognition models since 2018 (Villalobos, 2022).

The practical ramifications of this technological acceleration manifest in quantifiable performance metrics. AI systems have progressively surpassed human capabilities across multiple cognitive domains: image classification (2015), simple text comprehension (2017), visual reasoning (2020), and text-based logical inference (2021) (Maslej et al., 2024). The pace of advancement has been so rapid that established evaluation frameworks (e.g. ImageNet, SQuAD, SuperGLUE) have become insufficient as benchmarking tools, compelling the development of more sophisticated evaluation methodologies, which themselves struggle to present meaningful challenges to rapidly evolving AI systems (Chollet et al., 2024).

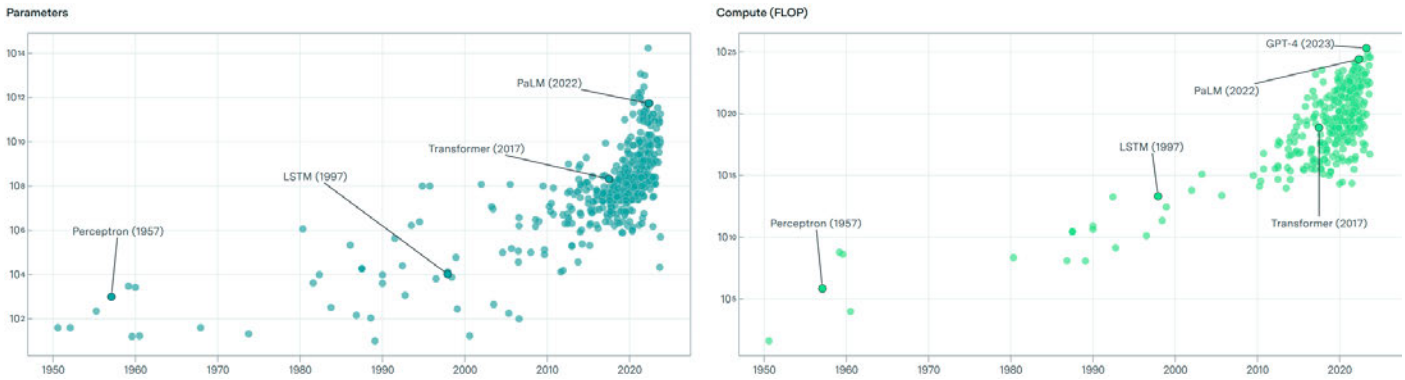

Figure 1: Exponential growth over time of number of parameters and computational resources employed in the training of AI systems (Villalobos, 2022; Sevilla & Roldán, 2024).

3.2 The Unabated Acceleration of AI

A corollary to this first observation, emerging from the analysis of key metrics, is that this acceleration shows no signs of slowing. In other words, if Artificial Intelligence indeed represents a paradigmatic shift, we are currently witnessing its preliminary phases rather than a completed transformation.
Like the advent of the Internet in 1995 or the mobile revolution of 2007, we are likely at the dawn of a transformative change. We begin to view, with skepticism, the first websites, the first applications, the first smartphones, questioning their true purpose and whether the surrounding enthusiasm is justified. As in these previous cases, we cannot predict the outcomes of this evolution or whether it will succeed. However, if AI proves to be an authentic paradigm change, it is plausible that its impact will be at least as profound and pervasive, if not greater, compared to previous technological revolutions (World Economic Forum, 2023).

Empirical evidence of this transformation can be observed in businesses' initial adoption of AI-enabled tools, their integration into production processes, and the use of generative models for increasingly complex tasks (Alex Singla et al., 2024). However, the rapid pace of these changes makes reliable predictions about future developments difficult.
In the specific context of Communication Design, the first quadrimester of 2024 has seen the introduction of over twenty advanced generative AI models by major sector players. Models such as Midjourney 6, Stable Diffusion 3, and Imagen 3 for image generation, Gemini Pro 1.5, Claude 3, ChatGPT-4o, and LLaMA 3 for multimodal tasks, Sora and VideoFX for video generation, along with Suno 3 and Stable Audio 2 for sound and audio generation, are the new models defining the state of the art in generative AI in 2024, and which will likely be obsolete by year's end.

Figure 2: "A hyper-realistic image of Harry Potter" as rendered by various versions of MidJourney.

Activities previously considered exclusively human domain, such as the generation of images, texts, videos, sounds, 3D models, and interfaces, are now beginning to be

executed with increasing sophistication by AI models, opening new opportunities and challenges. While the results in some of these tasks are still crude, the extremely rapid evolution of text-to-image models offers a paradigmatic example of how quickly this technology is progressing, and how soon we might see results that today seem beyond AI's capabilities. While Midjourney's first release in February 2022 produced rudimentary, barely recognizable images at small dimensions, unsuitable for professional use, version 6 (released in December 2023) has not only reached a level of quality capable of generating photorealistic images but has also progressively provided users with a series of tools and parameters useful for guiding image generation in specific directions. This rapid improvement does not constitute an isolated case but rather reflects a broader trend in the AI industry, eloquently represented by one of Silicon Valley's mantras according to which current models, however miraculous, are often presented as "the dumbest model any of you will ever have to use" (Altman, 2024).

With monthly frequency, increasingly sophisticated models redefine the boundaries of possibility in AI, rendering previous versions obsolete in a rapid cycle of advancement. In this context, the possibility of AI systems reaching human-level capabilities across a broad range of tasks has moved from science fiction to very concrete possibility, where several industry leaders, including Dario Amodei (CEO of Anthropic), Shane Legg (co-founder of Google DeepMind), and Jensen Huang (CEO of Nvidia), have suggested that these capabilities could emerge within the next five years (Amodei, 2024; Legg, 2024; Nellis, 2024). While speculations about the impact that reaching such a milestone could have are beyond the scope of this contribution, it is likely that, in such a scenario, concerns regarding the future of Communication Design might become secondary.

3.3 Learning from Examples

The third thematic cluster—crucial for communication design—focuses on how contemporary AI systems learn. Unlike traditional software, which follows rules explicitly coded by programmers, today's AI models acquire their abilities by studying large collections of examples (an "example-based learning" approach). This data-driven method represents a substantial departure from earlier algorithmic practice and is widely regarded as a paradigm shift within computational science.
While conventional algorithmic systems operate within predefined parameters and are particularly suited to tasks characterized by well-delineated and invariable rules, such as processing queries on complex data structures or analyzing formal systems, AI systems are capable of addressing more complex and nuanced tasks, such as image recognition and text translation. This capacity for adaptation and learning makes such systems particularly suitable for tasks requiring a high degree of flexibility and considerable generalization capability.
Within generative AI, this example-based approach most often takes the form of supervised learning, where—at a high level—models ingest vast collections of paired examples (an input such as a caption and the corresponding output, such as an image). Beginning with no innate skill, the system progressively infers the statistical relationships linking each input to its output and progressively develops a predictive model that can extend those learned patterns to new situations: identifying previously unseen objects, translating unfamiliar sentences, or generating fresh visuals from textual prompts.

This observation, apparently trivial, carries two corollaries. The first is that the nature of Artificial Intelligence systems is inherently tied to pattern identification and replication: it is essentially a mimetic process, where the computational apparatus acquires, through examples, the ability to imitate human behavior. The famous "Turing test," originally termed "imitation game" in the 1956 publication by Alan Turing (1956), proposes to replace the question "can machines think?" with a more empirically approachable issue:

"can machines exhibit intelligent behavior indistinguishable from human behavior?" In other words, it configures itself as an imitation test: it quantifies the effectiveness with which an artificial system manages to replicate human behavior and whether such replication proves sufficient to elude human discernment.
While the original Turing test was to be conducted through written conversation, today it's possible to conceive variants of the test applicable to a multiplicity of tasks: from image generation to language translation, to video production. In each of these domains, the fundamental question remains unchanged: is the produced simulation sophisticated enough to deceive a human observer?
The answer to this question is, increasingly often, affirmative. If some version of the Turing test in its original formulation has plausibly been surpassed without fanfare in recent years (Mitchell, 2024; Jones & Bergen, 2025), in the realm of visual communication, the most recent generative systems are capable of producing images that are substantially indistinguishable, and paradoxically even more convincing than real images.
As early as 2021, in a study where participants were asked to distinguish between real faces and AI-generated faces, the average accuracy was only 48.2%, substantially equivalent to random choice (Nightingale & Farid, 2022). In a subsequent study from 2023, the five faces most often judged as human were all AI-generated, while only one of the five faces most often judged as AI was actually AI-generated (Miller et al., 2023).
In light of recent progress in image generation systems (Flux, MidJourney, and Stable Diffusion), video (Sora, Runway), texts (ChatGPT, Claude, Gemini), and other types of content, it is realistic to admit the human observer's defeat regarding the ability to distinguish between AI-generated and real content. If for some type of content such a transition hasn't already occurred, it's reasonable to suppose it will happen in the very near future.
In the words of Microsoft's Chief Scientific Officer, Eric Horvitz, humanity finds itself at the beginning of a transition toward what he terms a "post-epistemic" context, a scenario characterized by a growing, if not insurmountable, difficulty in discerning between reality and fiction, with significant repercussions for the foundations of democracy, mechanisms of social trust, and communication paradigms in their entirety (Horvitz, 2022).
The initial manifestations of such phenomena are already before us. In reference to the journalistic context, in March 2024, shortly before the writing of this article, a network of websites dubbed CopyCop was identified, responsible for the dissemination of over 19,000 articles in English and French. Such content, originally sourced from authoritative journalistic sources, was "rewritten" by Artificial Intelligence systems with the intent of introducing elements of disinformation within substantially truthful news (Atherton, 2024).
In the social media realm, simultaneously, we observe the emergence of phenomena characterized by the exploitation of content designed to elicit specific emotional responses, such as anger, nostalgia, and indignation, to amplify engagement and increase profits through advertising strategies or other forms of monetization. Despite the extremism and low verisimilitude of this content often making it easily identifiable, sometimes becoming objects of derision among younger generations, their impact on older audiences (hence the colloquial designation "boomer traps") is steadily increasing, and the prospect of their evolution toward increasingly sophisticated forms raises significant concerns regarding the risk of growing dissemination of polarizing and manipulative content.
In general, the primary concern does not lie so much in the possibility of creating content indistinguishable from authentic content, but rather in the fact that the process of diffusion and industrialization of these practices may enable anyone to generate unlimited quantities of images and texts, automatically and at negligible costs, opening problematic scenarios regarding our ability to navigate an increasingly unreliable information context.

The second corollary is the observation that, in this mimetic process, the frequency of representation of a particular pattern in the training dataset is directly proportional to its prevalence in generation processes. Without appropriate precautions, in other words, artificial intelligences are subject to a phenomenon known in literature as "dataset bias" that leads AI models to replicate and amplify patterns present in training data. This means that due to the intrinsic nature of the learning modalities on which they are based, artificial intelligences do not configure themselves as inclusive tools, nor even neutral ones, but tend instead to represent the majority, the dominant form, the prevalent model, excluding minorities, marginal forms, alternative models (Mehrabi et al., 2021). In the design context, this tendency manifests through the communicative form of stereotype and prejudice, triggering a feedback cycle that reiterates and amplifies the dominant perspective, promoting a communicative monoculture (Bianchi et al., 2023).
The repercussions of this mechanism manifest in various ways: in facial recognition models that struggle to recognize faces of people with dark skin (Johnson & Johnson, 2023), in automatic translation models that translate in sexist or racist ways, in text generation models that produce discriminatory or offensive content. More insidiously, such effects also manifest in image generation models, visual representations that reflect prevalent aesthetic canons, traditional gender roles, and consolidated behavioral models, thus marginalizing alternative expressive forms, divergent visions, and critical perspectives (Anand et al., 2023; Naik & Nushi, 2023; Wan et al., 2024).
The probable large-scale diffusion of AI-generated content, predicted for the coming years, raises problematic scenarios in relation to the already complex issue of employing stereotypes in visual and textual content, and their role in perpetuating and reinforcing models of discrimination and inequality (Bucchetti, 2021). The risk is that of further exacerbating the gap between dominant visions and alternative visions, between consolidated forms of communication and emerging forms of communication, between hegemonic cultures and subaltern cultures, proposing a worldview where all Indians are old with beards and turbans, all women are models, all poor people are black (Turk, 2023).

Figure 3: 100 images generate using Midjourney with the prompt: “A Nigerian person” (Turk, 2023)

This intrinsically reactionary nature of generative artificial intelligences manifests both on

the representational plane and on the linguistic plane. Generative artificial intelligences, if left alone, through a sort of "cultural convergence" mechanism tend to converge toward rather recognizable styles, characterized by a "glossy" aesthetic that is simultaneously curated and homogeneous, reflecting dominant aesthetic canons inspired by the worlds of fashion, cinema, and advertising. A world made of saturated colors, marked lights and shadows, symmetrical compositions, young and attractive subjects, urban and minimalist settings, design objects and technology, reassuring poses and gestures, neutral and smiling expressions.
Regarding visual languages and styles, as with content, generative artificial intelligences are not machines for invention, but for imitation. Autonomously, they do not contribute to evolving the state of the art, do not give life to aesthetic experimentation or new forms of expression, except in cases where malfunction and glitch become an integral part of the creative process. While the deformed aesthetic of early GANs, the confusions due to mixed training processes, generation errors due to dataset artifacts, or model malfunctions have found recognition in artistic and experimental contexts (Klingemann, 2018; Obvious, 2018), the high-quality and realistic content generation capabilities of recent models have found lukewarm interest in the same contexts, which prefer to work through experimentation in training processes, dataset manipulation, creation of new models, where there is space for error, for the unexpected, for the unanticipated. Left to itself, AI innovates only when it doesn't function properly.

3.4Control and Collaboration

The fourth observation is that to overcome this highly imitative nature, it is necessary for the designer to be able to manage and control the generation process. Although this observation is also evident, the difficulty in controlling the generation process is still one of the main challenges limiting a more widespread and conscious use of generative artificial intelligences. While it is relatively easy to obtain a high-quality graphic/visual product from a generative model, it is extremely complex to obtain a result that reflects the designer's intentions, or even just to intervene in the generation process to modify the result in a controlled way. As assistants, generative artificial intelligences are comparable to talented designers and illustrators who don't speak our language, don't share our cultural references, and refuse to intervene iteratively on a project, preferring to produce results autonomously and independently.

The reasons underlying this difficulty are multiple and concern both the intrinsic nature of Artificial Intelligence models and the modes of interaction between designer and generative systems.
From a technical perspective, Artificial Intelligence models are notoriously difficult to interpret (Gilpin et al., 2018) and, beyond an understanding in terms of general generative principles, the reasons behind a particular generation process are often unpredictable and difficult to interpret. Context sensitivity, the tendency to produce different results from similar inputs, and opacity regarding internal generation processes make generative processes particularly complex to decipher and, consequently, difficult to predict, especially in scenarios that significantly deviate from the original training context.
From a semantic and cultural perspective, the context in which generative artificial intelligences operate does not correspond to that of users, and our knowledge of the world is not necessarily shared by AI (Prabhakaran et al., 2022). This can lead to results, sometimes amusing, sometimes disturbing, where Artificial Intelligence ignores key elements of context, producing results that do not reflect our intentions. If AI doesn't know that Waldo is a character notoriously difficult to find in a children's book, it might generate images where Waldo is clearly visible, or similarly, if AI doesn't know that Mother Teresa

was a religious figure known for her charity, it might misinterpret a request to generate an image of Mother Teresa fighting against poverty, producing images where Mother Teresa is depicted as a superhero fighting against an army of poor people.

Figure 4: generated image from the prompt: “A photo of Mother Theresa fighting poverty”

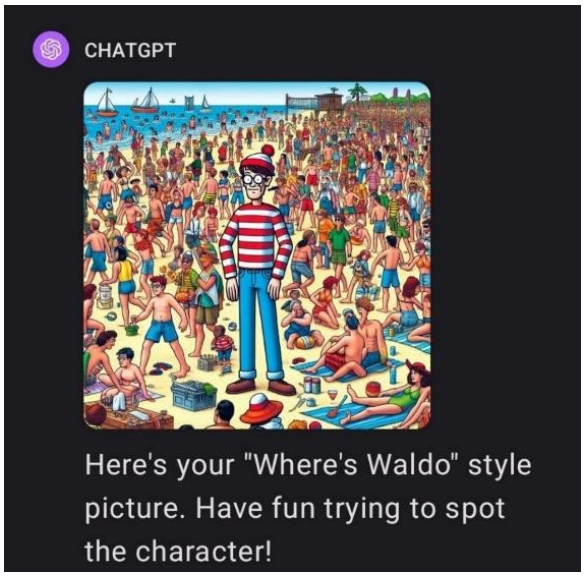

Figure 5: generated image from the prompt: “make a ‘Where's Waldo?’ picture”

Finally, regarding communication and collaboration modes with the user, control systems often prove inflexible. This difficulty in dialoguing with generative systems, well-known in the sector and subject of countless studies aimed at developing tools and methodologies to address it (Zhang et al., 2023), forces (for now) human designers to learn specific languages and interaction modalities to extract from artificial systems results that approach their intentions, in a process that is anything but immediate and intuitive. Training process anomalies, such as the presence of descriptions like "4k," "award winning," "trending on ArtStation" or "featured on Behance" in the captions of images present in the training dataset, are used as "magic words" that can be employed to induce the model to generate high-quality images. Image-specific area generation operations (inpainting) are used to apply corrections or modifications to problems in generation processes. Upscaling models are used to increase the resolution of generated images. Generation operations starting from images recompose collages of generated images to obtain more coherent results (Oppenlaender, 2022).
In contrast to the common perception of an automated and autonomous process where artificial intelligence models generate output independently from a textual description, the operational reality of generative AI proves significantly more complex. In the context of producing high-quality images, sector professionals confront a process that requires specialized competencies and may involve generating hundreds of images with different prompts and parameters, followed by a process of selection, combination, layering, manual editing, regeneration, and refinement that can require numerous iterations, the employment of multiple models and tools, and considerable time investment.
Depending on objectives and context, these control-seeking operations can occur at different levels, requiring more or less advanced competencies, more or less in-depth technical knowledge (Cotroneo & Hutson, 2023). Whether control occurs through accurate definition of the textual input guiding generation (prompt engineering), through integration of control models within the generative model (spatial conditioning), through adaptation of pre-trained models with specific objectives (fine-tuning), through selection and manipulation of training data (dataset curation), through modification of generation models (model hacking), the designer must be able to intervene in the generation process so that the model serves the designer and not vice versa.

Regardless of the level of technical depth, controlling generation processes requires a thorough understanding of the mechanisms underlying Artificial Intelligence systems, the modalities through which these can be influenced, and the consequences that can derive from such interventions. This knowledge, which requires a non-trivial level of technical competence, becomes fundamental, with the development of generative Artificial Intelligence technologies, to enable conscious use of these technologies, and to enable profitable and responsible use of the same.

Alongside these significant difficulties in controlling the generation process, if designers were to then venture into creating new models, they would face additional challenges related to controlling the learning process, which adds further ethical and design considerations to the already significant technical and methodological difficulties. If controlling the generation process requires a thorough understanding of the mechanisms underlying Artificial Intelligence systems, the modalities through which these can be influenced, and the consequences that can derive from such interventions, controlling the learning process requires an analogous understanding of the mechanisms underlying training mechanisms, the modalities through which these can be influenced, and the consequences that can derive from such interventions.
The typology of data to which they are exposed, the quality and quantity of this data, the modality of labeling and filtering, the selection and manipulation of training data, the definition of objectives and evaluation metrics, the choice of models and algorithms, the definition of parameters and hyperparameters, the evaluation and selection of models, the management of biases and distortions, are all elements that require specific competence and ethical awareness that go well beyond the technical competencies required for using pre-trained models (Whang et al., 2021).
The omission or underestimation of one or more of these elements can result in AI systems that uncritically replicate patterns and relationships present in training data, potentially amplifying discriminatory, racist, sexist, or otherwise problematic characteristics. The experience of the Tay chatbot, developed by Microsoft in 2016 and withdrawn after a few hours due to racist and offensive behaviors (Schwartz, 2019), highlights the intrinsic complexity in preventing harmful behaviors by Artificial Intelligence systems, and emphasizes the responsibility of designers not only in the model development phase but also in defining operational contexts and ethical limits within which AI must operate.

These difficulties in controlling generative models, which will certainly find solutions or mitigations in the future, do not imply that these technologies cannot be used to realize high-quality projects with great impact. On the contrary, the conscious and competent use of these technologies has already led to the emergence of new expressive modalities, new forms of communication that have contributed to the renewal of the creative and design landscape. They emphasize, however, the necessity for designers to possess not only technological competencies but also knowledge in terms of visual culture and language that allows them to understand the tool's potential, imagine the result, and be able to guide the process.
From a technical perspective, it becomes fundamental that designers acquire a solid understanding of the mechanisms and fundamental principles of Machine Learning processes, in order to be able to choose and manage the most adequate tools based on their objectives. At the same time, understanding the cultural context, visual culture, and reference terminology proves equally crucial, especially when operating in areas where content generation is closely tied to semantic and cultural interpretations.
Language, elevated to a primary tool for controlling and guiding the creative process, reveals the mastery of artistic, stylistic, and linguistic references, along with the ability to

express oneself in perceptual and semantic, cinematic and photographic, typographic and compositional terms, which allow steering the model in the desired direction. The designer's cultural and visual repertoire becomes the lexicon for dialoguing with AI.

3.5 Impact on Practices and Education

The final thematic cluster emerging from the analysis of AI discourse refers to the impact on technologies on the profession and practice. While in Communication Design the most visible current applications are tools for image generation or background removal, AI technologies have the potential to radically transform the modalities of production and consumption of visual and textual content, as well as communication and design processes. Artificial Intelligence represents not merely a new tool, but a new paradigm that demands critical analysis and redefinition of professional boundaries and competencies.
While on one hand AI relieves designers from operational tasks, such as background removal, photo retouching, and image cataloging, on the other hand we are already observing the first signals of a deeper restructuring of creative processes, with the emergence of tools where the design process itself becomes AI-assisted, requiring designers to assume a role as curator and art director, delegating part of the design solution exploration activities to autonomous models (Adeleye, 2024).

This transformation is not unique to design. In medicine, for instance, AI systems are demonstrating unprecedented diagnostic capabilities, particularly with complex pathologies like neoplasms. Recent studies (Donnelly et al., 2024; McKinney et al., 2020) show these systems achieving precision comparable to, or exceeding, human capabilities, enabling significantly earlier diagnoses than traditional methods.
A famous 2019 article in the British Journal of Radiology posed the question that many fields now face: "Will Machine Learning end the viability of radiology as a thriving medical specialty?" (Chan & Siegel, 2019). Their conclusion suggested that while AI systems would not replace radiologists, the field would need to adapt to a new paradigm where AI becomes an essential tool.
This reflection extends across professional domains, from law to journalism, from engineering to medicine: how will Artificial Intelligence transform our working practices, and what competencies will be necessary to adapt to this evolution?

Despite a tendency toward exceptionalism, Design too is called to a serious and urgent reflection on the competencies and knowledge necessary to face not so much the current technological context, but the future of exponential growth that seems to await us. In the university and advanced education context, the question is even more urgent: how to prepare new generations of designers for potential future scenarios? What competencies to transmit to students enrolled in 2024, who at the end of their educational path will find themselves operating in a professional context radically different from the current one? Once again, the answer goes beyond updating study programs with the introduction of new technologies and requires a collective reflection on how Artificial Intelligence interacts with design disciplines.

4. Discussion: responsible collaboration with AI

4.1 Culture and Code: A Tentative Direction for AI in Design Education

At this point, after five observations, we risk a hypothesis. Politecnico di Milano, one of the top universities in Europe by number of students and by ranking (QS Ranking, 2025), has offered, since 2003, a bachelor's degree and a master's degree in Communication Design. The approach to design that characterizes the course is a Polytechnic approach, which

combines human sciences and technology in the formation of professionals capable of managing visual and multimedia communication processes consciously and critically. The hypothesis we make for a responsible collaboration with AI is articulated in these two areas.

Regarding the human sciences dimension, the progressive delegation of operational tasks to AI systems is shifting the designer's role toward creative direction, curation, and guidance of the design process. In this context of increasing automation and tool autonomy, a deep understanding of visual cultures and imagery becomes crucial. This knowledge enables designers not only to maintain an active role in guiding generative models but also to conceive and communicate design visions effectively to both human and non-human collaborators. This evolution demands careful attention to ethical responsibilities. Designers must ensure that automation neither perpetuates biases nor reinforces stereotypes, while preserving diversity in visual culture. Although AI collaboration can enrich creative processes, designers retain full, non-delegable responsibility for their own choices and those of artificial collaborators, toward clients, users, and society.

Regarding the technological dimension, to avoid being relegated to a passive role as tool users, it is necessary for designers to acquire a deep understanding of emerging technologies (Torrisi, 2017). Such knowledge is fundamental not only to direct and coordinate artificial junior designers but aims to redefine the perception of Artificial Intelligence: not a static software, but a fluid and malleable process, in which it is possible to intervene to experiment, and to construct one's own tools. This ability to intervene at the technical level, by modifying photocomposition processes, printing procedures, photographic reproduction techniques, has always constituted a fundamental element of a critical design culture, aware of the tool's impact in the creative process and capable of imagining solutions that go beyond the consolidated repertoire. In the AI context, where the default mode is copy, imitation, replication, and stereotype, the ability to tamper with the tool, to exploit its limits and weaknesses, becomes crucial to overcome the conception of the tool as mere automation and liberate the creative and critical dimension proper to design.

4.2 First steps at Politecnico di Milano

At the School of Design of Politecnico di Milano, in the Communication Design degree, the first steps have been taken in the direction traced by this hypothesis. Beyond various types of experimentation with generative AI tools in bachelor's and master's degree design laboratories, the educational offering has been enriched by teachings including "Visual Cultures and Iconographic Systems" in the first year of the bachelor's degree and "Digital Image Culture" in the first year of the master's degree course, with the objective of contributing to providing the critical, cultural, and interpretative competencies necessary to face the new design context. Parallel to this, in the context of advanced educational paths (Politecnico di Milano, 2025), the "Computational Visual Design" course has been activated experimentally through which students have been called to confront the technological dimension of design. Specifically, the course proposes to provide the conceptual and technical tools to address communication design in computational terms, providing conceptualization, modeling, and abstraction competencies useful for facing design in a context where Artificial Intelligence is an integral part of the creative process.

In the research context, the relationship between communication and AI develops along

multiple trajectories, encompassing critical analysis of technologies and practices, experimentation in specific applications, and exploration of new expressive modalities, with ethics and responsibility as common threads. This diversity is reflected in recent master's research projects ranging from analyses of gender bias in generative model training datasets (Bazzan, 2022), to studies of AI adoption in independent publishing (Cozza, 2024), to mappings of AI as a design support tool (Bruno, 2023), highlighting the need for critical examination of algorithmic stereotype reproduction and the designer's role in mitigating biases through dataset curation and interpretation, while raising questions about authorship, originality, and editorial responsibility.
More experimental directions of research have explored technical aspects of AI development, moving beyond pre-trained models to systems tailored for specific design needs. Examples include GAN training from curated datasets for automated visual asset generation in brand design (Urietti, 2023) and fine-tuned diffusion models for representing complex territories like Po Valley, integrating photography with AI to create new representational paradigms (Pennacchioni, 2024). These projects explore AI not merely as an efficiency tool but as a medium for investigating novel forms of representation.

5. Conclusions

While these initiatives represent a promising beginning, they are intentionally provisional: they should be seen as an initial reflection intended to spark further experimentation. Curricular structures will need to be validated through evidence-based evaluation and ongoing dialogue with students, faculty, and external partners. At this stage, we do not feel it is yet appropriate to present detailed proposals, beyond the invitation to keep cultural and technical dimensions in view together, in order to avoid both technocratic reductionism and self-referential drifts.
Forecasting the future remains challenging: we might be significantly underestimating the transformative impact of exponential growth on Communication Design, or developments in generative Artificial Intelligence may be approaching a plateau. Regardless of the path AI takes, successfully navigating this transformation requires both deep cultural literacy and technical fluency to help designers maintain their role as conscious mediators of communication, capable of guiding AI tools while remaining mindful of their broader societal impact. The future of design education lies in the introduction of new tools, but in fostering professionals who can critically engage with technologies while maintaining the ethical and cultural awareness essential to responsible design practice.

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CRITICAL MAKING AND GAME DESIGN IN THE CLASSROOM: A PEDAGOGICAL APPROACH TO EMBEDDED VALUES IN DESIGN.

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ABSTRACT | Scholarly approaches to design, like critical making (DiSalvo, 2014) and critical design (Dunne, 2008; Raby, 2008) have been establishing an open ground for reflective conversations about social structures and practices over the last 20 years. These practices are recognizable for their high level of discussion and deeply academic approach and have provided design researchers the opportunity to use *research through design* (Frayling, 1993) as a practice of tangible-criticism and analysis of cultural and social aspects. Unfortunately, these practices are rarely discussed in undergraduate programs, since they do not represent a professional tool for the development of young designers. Nevertheless, looking into the periphery of what is considered as viable or desirable might provide designers with a powerful tool of analysis of the underlying or unexpressed values of the system, and a way to brings those values into the conversation.

This paper presents an experience in which critical design, ethics, and experimental game design were introduced in the classroom, presenting the notion of the tangible spaces of the game and their ability to allow user enacting social rules, and practices and experience different perspectives of complex social issues as a mechanism of reflection. Through a process of reflective action, the paper introduces a framework of analysis of games as objects of enactment and self-experience. Using games not only as boundary objects (Bowker and Star, 1999; Rhinow, Köppen and Meinel, 2012) but as conversational probes (Galey and Ruecker, 2010) that can be used in common design practices to reflect, discuss, or map values and intentions (de la Rosa, 2022).

KEYWORDS | Critical design, Game design, Embedded values, Ethics, Design pedagogy

1. Introduction

Over the years design programs have evolved from the craft-paradigm that focuses on aesthetics and the study of the form, to more robust programs that include basic research, user and huma-oriented views, and project-based approaches (Muratovski, 2016). And even though some of them have included ethics and critical thinking as part of their practice or in some cases as part of the curriculum, it might still be seen as an emerging conversation in the field and in the classroom. This paper presents a theory-based argument that discusses the introduction of initial reflections over ethical principles of design and critical making in the classroom, and how these conversations can lead to design projects and professional practice.

It is clear than design disciplines carry a big role in society, as they seek to investigate the near future as an unraveling reality. According to Simon (1969), the sciences of the artificial (as he denominated design), investigate the way the constructed world comes to existence, and therefore, they look from a systemic perspective at the gaps in our human experience of the world, the preferable structure of that system, and the different tangible actions that can change one into the other. As Nelson and Stolterman (2003) described it, design experiments with the not-yet-existing, what is on the verge of existence of the artificial world, giving form to artefacts as well as to relationships.

The argument implies that design does more than to configure (or give shape to) the artefacts around us, but it also prefigures (or predetermines its role in) the relationships that those artefacts will carry. This idea relates also to the work of Latour (1992) and Akrich (1992) on how technical objects are '*prescribed*' with functions or affordances, and how those carry a delegated agency into the system where they are deployed. This *script* represents an intention as well as a worldview, of what is desirable or acceptable, and the constrains or barriers it imposes (Norman, 2013) and what is the role that the artefact should contain. Those *politics* imbued in the artefacts are unavoidable, and have been studied thoroughly, from the arguments presented by Langdon Winner (1980) regarding the politics of the artifacts, to the seminal work in systems design of Helen Nissenbaum and Batya Friedman (1996) discussing how the values embedded in artefacts through the design process remain active as people interact with them, creating biases in those interactions.

This latter scholar work has recently also impacted game design research, as it has addressed a critical reflection on how the nature of social simulation of games might present and area of research as well as an opportunity for designers to address social issues or explore possible social repercussions of their work. As Flanagan & Nissenbaum (2014) discuss, values can be seen as an active element of games, as they are part of the set of rules and constrains of the game and are constantly encouraged or penalized over the actions of the game. The simulation of a context and the social rules create a favorable environment for experimentation of boundaries and value-alignment of the players/users with the proposed system.

Romero (Brathwaite & Sharp, 2010) has also incorporated this reflection in her scholar work, leading to the design of games like *Train*, where players are carried through the experience of following orders and complying with the rules of the game to find out a nefarious final goal of the game. A critical position that invites users to explore cognitive and emotional responses to value-systems and possible dissonances between action and consciousness.

Flanagan, Belman, Nissenbaum, & Diamond (2007), extended their practice to the classroom, and involved design students in the analysis of possible embedded values in different common games, and how those values might affect the gamers experience or perception. Furthermore, students had the opportunity to participate in scholar research and reflect in the possible repercussions of their professional practice beyond game design, including how values are imbued in the artefact's through the design process, sometimes without a clear understanding of those involved in the process.

Reviewing this idea through the lens presented by Verbeek (2011), where designers might be seen as responsible for making '*morality tangible*' in the objects being designed; therefore, there is

a need to consider which morals are imbued into the design process and how those values are becoming tangible in the result. Furthermore, to evaluate if the scripted values and morals in the objects being design are indeed affecting individuals, communities or the techno-social systems where they exist.

The experience presented in this paper is based on an experimental design course, where design students are included in faculty research and practice with an ethical approach to what it means to be a graphic designer in a globalized world, where our actions can affect people beyond our frameworks and models of what is being designed.

2. Case Study: Ethics of a Designer in a Global Economy (EDGE)

2.1. A curricular approach to ethics

The course EDGE is an experimental approach from the Graphic Design program of the University of Illinois at Urbana-Champaign, where faculty members are invited to involve students in an academic conversation that intersects faculty's research interests and a reflection over the ethics of design. It is described in the pensum as "A studio course that presents complex problems and addresses ethical issues in graphic design, including social and environmental issues…"

This is a 16-week studio course, with two sessions of 160 minutes every week. Its flexible approach not only gives extreme freedom to the faculty members who are teaching it but encourages a critical reflection over the role of design. This principle presented a great opportunity to explore the topic of embedded values in design and the possible ethical questions that might emerge from this, including the responsibility of designers in possible unintended consequences, the power of design from a systemic perspective and the limits of the profession.

On this context, the class was presented with the idea of games as both a cultural tool of assimilation and a simulated environment where ideas can be introduced or discussed outside the real world, and the notion of embedded values as part of my scholar research. The definition of games has been a longstanding question both in cultural studies and in scholar research (Flanagan, 2009; Romero, 2009) as they carry the ability to create exploratory realities, phenomenon described by Johan Huizinga as the "magic circle" in his 1938 Homo Ludens (Rodriguez, 2006) and present a different cultural framework to discuss values and actions.

A clear reference is the work of Elizabeth Magie in the design of "The Landlord Game" as a critical device to discuss social norms, economic models and ethics. In what we might consider today as a boundary object, Magie presented two simulations of different economic models for players to experience, hoping that they were able to become more analytical of the dangers of capitalism and monopolies (Pilon, 2015). The game was later redesign by Charles Darrow, who created a competitive experience of exhilarating buying frenzy that masked the overall feeling of mistrust and betrayal that Magie intended, leading to the birth of "Monopoly".

More recently, scholars like Brenda Romero and Mary Flanagan (2014) have presented seminal work in the field of game design, where they have explored how the contextual simulation of complex social issues might introduce players to ethical dilemmas that might pass underdiscussed in our society merely because the subjects are normalized or based on cultural biases or misconceptions.

Introducing students to this topic also relates to the idea of "Critical making" or "critical design" (DiSalvo, 2014), where designers go farther than communicating a personal opinion on a complex subject, and explore their ability to produce tangible artefacts (either visual or physical) that can explore a complex subject in a reflective way, *scripting* a question rather than an answer, and designing games as "boundary objects" to spark conversations among players.

2.2. The design project (pedagogic approach)

Based on the theoretical framework presented above the exercise was presented as an 8-week project were students needed to explore one socially complex topic from a systemic perspective. The students were then presented with scholar discussions about game design, embedded values and critical design, as references to the project, making an emphasis on two main aspects. First, that values and politics are always embedded in the work designers do, and second, that using prototypes and games can help us test design hypothesis, since the context and rules of the game might present an ideal infrastructure for collective scenario-making and reenacting. So, users can get a real glimpse of a scenario but also step on the shoes of other stakeholders. Therefore, a class of 16 students (mostly junior or third-year) were asked to form small groups (2 to 4 students) and stablish an initial conversation based on a Popular Media Scan. For that, each student was asked to bring an informed argument about a complex social issue that they wanted to introduce to the class. Each group then worked as a focal group where topics were discussed and filtered to reach one subject that all members find relevant for their project.

After that, the group was asked to conduct secondary research on the systemic causes and consequences of the issue they selected, focusing especially on the social dynamics behind it and the different perspectives or worldviews that could make that a "wicked problem" (Rittel and Webber, 1973). The main objective here was to recognize how human intentions and decisions, as well as the context in which they occur, could be the actual cause of many of those issues.

Based on the report presented, student groups were presented with a UCD framework that extended the idea of the "Hero Journey", adding different layers to the model and a sense of balance and variability that explored affordances and constrains in different layers (Figure 1).

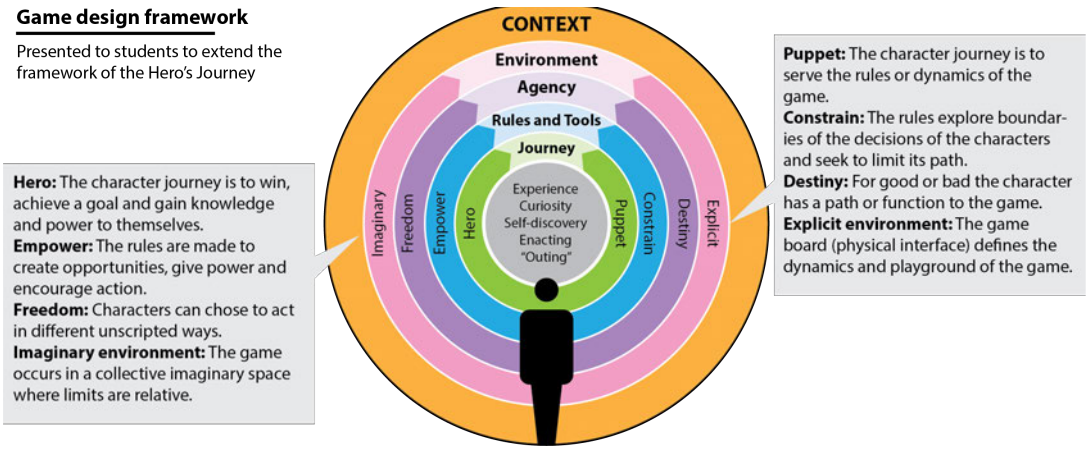

Figure 1. Expanding on the idea of the hero's journey a framework of analysis for the game was presented to the students to categorize affordance and constrains in different levels. The journey is defined as one of self-discovery through enacting outside your own skin.

First, recognizing that in the journey, the narrative of the hero implies a balance between their ability to make decisions and the limits on the narrative that can turn the hero into a puppet. This balance is framed under the "rules and tools" of the game that are there to create opportunities and empower decision-making or to create barriers to the ability of the hero to act, which defines a third layer, that is the overall "agency" permitted by the game, where the players move between the freedom and a pre-scripted destiny that is imposed. Finally, a fourth layer that determines the environment in which this game is played; from an imaginary world defined by the players to a completely determined board where even moves and positions might be based on a closed grid.

All these layers of interaction most exist inside a socio-cultural context, were decisions and actions should make sense, and the role of the game is to lead the actions to uncover that underlying context and rules from a different perspective.

At the end, 7 games were designed with the following subjects and reflections:

Table 1. Games presented.

Name of the game	**Topic**	**Argument**	**Category**
Artifaction	AI in art	Artists and designers are in a constant war to defend art production as the soul and reflection of society. Players must join forces to defend pieces of art as they see the historic significance they carry.	Tabletop RPG
Green Gambit	Sustainable energy	The search for green or sustainable energy might be populated with a lot of deception. Players must deceive others on their ability to apply sustainable energy and prevent global warming.	Cards bluffing
Ocean Defenders	Ocean pollution	Fight to win and clean your ocean the fastest, as you realize that a non-collective approach might lead to disaster. Players must decide if they work together or alone to reach their goal.	Strategy dices
Roots to riches	Sustainable farming	Be sustainable or grow, that is the dilemma. Players are asked to grow their sustainable farming practices to realize that industrial farming might be a consequence of growth.	Tabletop strategy
Price crunch	Production and demand	Be a consumer or a producer and try to avoid inflation in a global economy. Uncover the complexity of free markets and the little agency of consumers as you play the game.	Economic game
Wargames	Decision-making in complex situations	Who is the bad guy and who is the good one. Roll the dices and face complex dilemmas, make tough decisions and face the consequences, then explore the context in which others decided.	Decision-making
Fragment	Infrastructure as a tool for segregation	Build roads and schools, empower your community as you dominate the board. Discover how infrastructure has been used to break and colonize communities	City building

As seen in table 1, each game presented a complex social dilemma where either human intention or social context have made it very hard to address and find solutions. Therefore, players are intentionally set up in a place where they should follow the logic of the game or fight against it, always with a reflection and a discovery as part of the goals of the game.

Defining this structure offer the student a project where they can explore how designed environments can introduce rules and constrains that can alter human behavior and decision-making, as well as to recognize how the game's narrative can lead players into a realization moment when they can discover personal biases or view another perspective of a complex social issue.

2.3. The games

In the final stage, groups started the interaction design process based on their research of the issue they selected and game objectives, then started ideating possible forms of gamification of those dynamics that could create the proper scenarios of interaction for the users (gamers).

Due to the complexity that comes from designing for human interactions, groups created complex paper prototypes to test with users. The prototypes used paper cards quickly drawn and modified, and permitted students review and make quick changes in the process; some also included tokens and elements from other games repurposed to support the interactions (Figure 2). This prototyping process proved to be very successful, to the point that students requested a second iteration of the testing process later in the course.

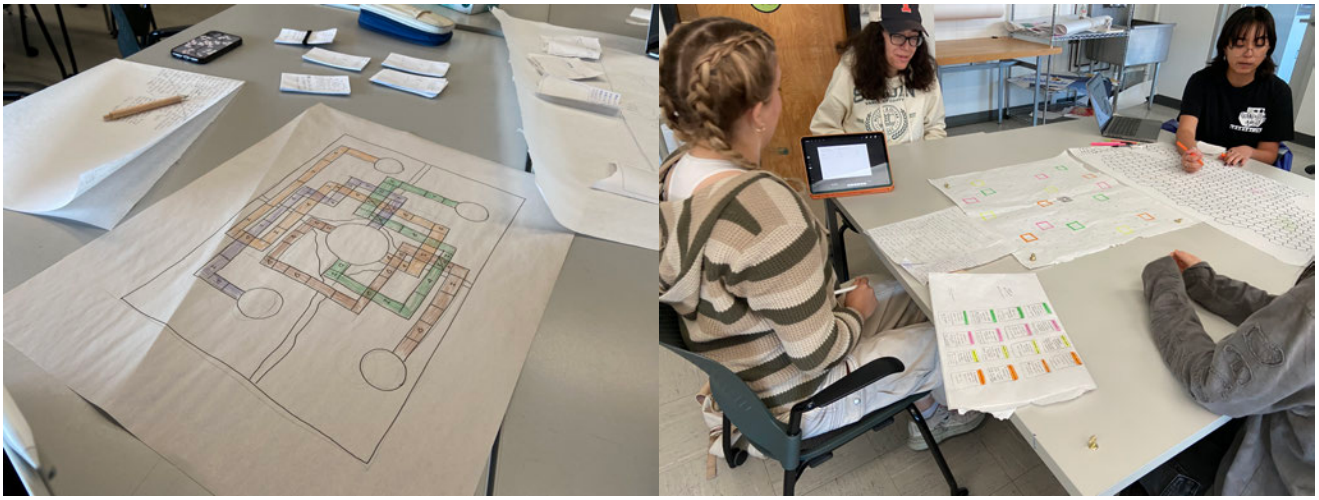

Figure 2. Paper prototyping phase where students tested the intended rules and interactions of the games.

Once the students finished the prototyping phase, they started the visual design of all the elements of the game. Including boards, physical elements, rules of the game, and all functional and aesthetical elements required. Encouraging a process of prototyping and testing as an initial phase helps students recognize that visual design, especially when working with human interaction, does not start as a visual practice, but as a reflective practice over the use of tangible artefacts. In that sense, the use of visual software in the sketching phase becomes non recommended, since it might promote a "sunk cost fallacy" and limit flexibility and adaptability that are more important in the process.

The results of the project were fully finished games with all their parts, instructions and packaging (Figure 3) and were finally tested by other students to recognize if the critical side of the project remained appreciable to the final user and if the games sparked a reflection about human intentions and decision-making in different situations, especially when the rules of the system might determine our actions. Two interesting examples of that dilemma can be seeing in the games "Roots to riches" and "Game of War" (Figure 4). In the first one, players are asked to stablish a sustainable farming business, but through the game, the system keeps asking them to grow, and provide different paths for that, until players realize that through the rush of the game, they have forgotten the values of the game and moved into industrialized farming. In "Game of War", four character with different levels of power and agency in a war conflict: a president, a general, a soldier and the parents of a soldier, are given private considerations for their decisions and asked to act accordingly in the game, despite the damage it could bring for others. When the game has reached a level of development, players are asked to exchange characters, so they can recognize the reasons for their decisions and how complex change might be.

Figure 3. Final results included 3D printing of pieces, packaging of the game, and full instructions.

Figure 4. Students playing the Game of War and Roots to Riches, two of the presented games.

Other games, like "Fragment", asked players to protect and grow their communities by building public infrastructure, through the game players soon realize that the public infrastructure can be weaponized, like the example of overpasses given by Langdon Winner (1980) or the case of the highway system in the south of Chicago. All these games have something in common, the goal for students was not to produce a functional product, but to recognize how values can be actively incorporated in the design process and the potential use of design to create scenario-based simulations using gamification and value-oriented design as tools for critical thinking and raising awareness over highly delicate issues.

Addressing these issues had clearly an effect on the students. First, they followed a critical path as a mental process. At the beginning they only brought a basic idea informed by some initial research, but as they advanced into the design of interactions and politics of their games, they quickly started asking more complex questions about the subject. Initially as a reflection over our own views and biases on the subject, recognizing even counter arguments to their own believes. Over the course of the weeks, students came to conclusions over the subject's invisible rules and values, and the inevitability of some relationships inside systems that are embedded with certain values. Second, students became more aware of the responsibility of their role in the design of daily objects, since many of them recognized through the game an ability to influence the way people see those complex issues; from creating new frameworks for decision-making or constructing intentional social contexts that could alter the conversation, to lead people into recognizing the consequences of their own decisions.

As this process became more academic, as possible outcome to their work, students were given the option to submit a poster to a research conference. Even though it is evident that these were not examples of structured research, the idea was that some students could explore the possibility of continuing their academic process through a more scholar path. As a result, one of the groups got accepted for a poster but decided not to present in the conference. Some of them reported to see this path as too far from their current reality.

The pedagogic approach presented for this project seeks to change the focus of the process for students, so they can recognize their responsibility as professional designers, their agency in producing social change, the power of design as a research tool and the importance of embedded values and politics in the design process. At the end, students reported having fun in the process but also recognizing the importance of their roles and

the responsibility that comes with it.

3. Discussion

Although game design has been both a professional field and a topic for design education for many years, the approach in many cases remain, similar to must design topics in formal education, limited to the extent of the commercial or industry use, seeing it as a problem of interaction, product or graphics. And although, this approach is necessary for young, learning designers, since it leads to the understanding of best practices and industry standards, it might not be enough in the process of preparing critical and ethical leaders for the field of design. For that purpose, we might need designers who are capable of understanding the responsibility that comes with the role of configuring our artificial reality, prefiguring human practices, and imbuing our socio-technical system with unchecked values.

In this particular case, designers where able to experience different tools for design that can be used in their professional practice, like performing a prototyping process, testing those prototypes with users and collecting qualitative information from that interaction, as well as elements of both interaction and experience design. They also learned more experimental approaches, like the use of prototypes as conversational objects that can sparked critical reflections over complex issues. But more importantly, they explored the ethics of their profession, and the sense of professional responsibility that should come with the job.

Students reported a sense of achievement with their projects and the fact that the games were "...actually fun to play!", as well as because they were able to see people (users) interacting with their ideas. They also stablished far more complex analysis about their subjects at the end of the process, increasing the scope of their view and the depth of their observation.

Donald Norman has recently included this wide view of both the structure of the system as well as the long-term consequences of our actions as principles for what he calls "Humanity-Centered Design" (2023). Expressing something that the scholar community has been addressing over the last 40 years, on how there is a need for a larger view into the future for the design fields, a view that as Irwin, Kossoff and Tonkinwise (2015) stated, sees sustainability as the only "preferred future" of us all, and defines it as a principle for design field to use as a framework.

This definition of leadership goes beyond the idea of project management or MBA tools, it is not a managerial approach for designers, since it is not about 'managing' resources, but instead, as thought-leaders who really understand the deep impact that design practices could have in socio-technical systems and how much awareness of the responsible actions and limits of design is required in our contemporary world.

Educators must find tools in their scholar work to bring those conversations into the classroom and expose students to deeper conversations about their future roles and responsibilities. Game design presents a perfect field to explore these subjects, since it can create a full simulation of social practices and explore in a very experimental way how agency, decision-making process, norms and rules, and rhetorics of goals and objectives can define behaviors and the construction of mental models.

Game design as critical making presents a perfect platform for researchers to understand and question users, a boundary object to explore possible solutions and individual perspectives and a great example for young, non-scholar design students that can reflect on their practice and limits as they have fun exploring critical scenarios.

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Cultural Bias and Ethical Challenges: A Study on Inclusivity in AIGC Models for Global Fashion Design

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ABSTRACT | The application of Artificial Intelligence Generated Content (AIGC) in global fashion design has grown rapidly, yet it has also revealed significant cultural bias. Through qualitative and quantitative analysis, this study examines the performance disparities of existing AIGC models across different cultural contexts, highlighting how training data dominated by Western cultural references has led to insufficient or distorted representations of non-Western fashion aesthetics and styles. Based on these findings, the study proposes a theoretical framework centered on diverse cultural datasets, cross-cultural adaptive generation algorithms, and dynamic optimization mechanisms, aiming to explore the inclusivity and adaptability of AIGC models within a global cultural context. The paper concludes by discussing the potential theoretical implications of this framework and offering new directions for future research and practice, further examining the possibilities for AIGC models to more authentically represent cultural diversity.

KEYWORDS | CULTURAL BIAS, AIGC, GLOBAL FASHION DESIGN, INCLUSIVE FRAMWORK, CROSS-CULTURAL ADAPTATION

1. Introduction

Artificial Intelligence Generated Content (AIGC) technologies, such as DALL-E and MidJourney, have seen rapid adoption in the field of fashion design in recent years. By generating images from textual inputs, these tools offer designers highly efficient visual creative support. However, the current training data for these models predominantly reflects Western cultural contexts, revealing significant limitations when addressing non-Western cultural elements. This cultural bias stems not only from imbalanced foundational data but also potentially exacerbates issues of cultural appropriation and visual style homogenization. This study seeks to uncover the root causes of cultural bias within AIGC models and proposes an inclusivity framework aimed at enhancing the applicability of these technologies in diverse global cultural contexts. This framework not only shapes the central structure of this study but also provides a directional guide for future related research.

2. Literature Review

Barthes (1967) argued that clothing is not only a physical product but also a cultural symbol. However, with the application of AIGC technologies in fashion design, issues of cultural bias have become increasingly prominent, particularly the influence of Western-centrism. Ramsey et al. (2025) observed that many public datasets, such as DeepFashion and Polyvore, are heavily populated with Western high-fashion imagery, resulting in a global imbalance in design elements. Similarly, Malobola et al. (2022) highlighted that the lack of representation in datasets makes it challenging for AIGC to accurately reflect African styles, further exacerbating cultural bias.

To address these issues, researchers have proposed various strategies. Wu et al. (2024) and Xie (2024) advocated for the use of multimodal learning and culturally diverse datasets to enhance cultural representation, enabling a more comprehensive capture of design elements from different cultural contexts. Mantri (2023) integrated large language models with diffusion models to optimize text generation strategies and ensure cultural diversity in generated content. Huang (2023), through the FIRST dataset, provided rich textual descriptions and diverse fashion categories to promote cultural inclusivity in AIGC for fashion design. Gabriel (2023) and Ali (2024) explored the use of multilingual models to address semantic and grammatical cultural differences, helping to mitigate bias. Zhang (2024) introduced the Logical-GLM model, which generates more logically structured textual instructions, allowing AIGC to more accurately reflect multicultural perspectives in the generation process.

3. Research Methodology

3.1. Research Design

This study employs an experimental research approach to systematically investigate how AIGC models represent cultural elements and the potential biases therein. By selecting representative AIGC tools and cultural elements, standardized prompts are constructed to generate images. These images are then evaluated to analyze variations in model performance across different cultural contexts.

3.2. Data Sources, Sample Selection, and Cultural Element Setting

To ensure the representativeness and reliability of the findings, this research selects three widely-used text-to-image tools, covering both international and domestic platforms: DALL-E (USA: OpenAI), Stable Diffusion (UK: Stability AI), and Dreamina (China: ByteDance). These tools were chosen for their high quality of image generation, large user bases, and diverse application scenarios, providing a broad spectrum of generated image samples for subsequent experiments.

In terms of sample selection, this study focuses on clothing styles from China, the UK, the US, Africa, and India—five distinct cultural traditions—to assess how AIGC models handle different cultural symbols and identify potential biases. Chinese fashion elements include motifs (dragons, phoenixes, auspicious clouds), qipao, brocade, and characteristic color schemes (Chinese red, blue-and-white porcelain patterns). British fashion elements cover Victorian styles, Scottish tartans, and classic color combinations (red-and-green tartans). American fashion elements feature denim, the Stars and Stripes, and Hollywood-inspired styles. African fashion elements include iconic garments such as Agbada and Dashiki, as well as African wax prints and vibrant colors. Indian fashion elements encompass sarees, churidars, Bollywood-inspired designs, and paisley patterns and colors. These culturally distinctive elements serve as a robust testbed to evaluate the models' capacity for cross-cultural design generation.

A standardized prompt structure is used to ensure comparability of outputs across different AIGC tools. Each prompt specifies the type of garment, cultural elements, colors, materials, and intended occasion, with cultural elements being the sole variable. A typical prompt might be: "Design a modern [garment type] that incorporates [cultural elements], with [colors/materials], suitable for [intended occasion]." This standardized approach minimizes noise from variations in prompt wording, allowing for more precise evaluation of the performance of different cultural elements in the generated results.

3.3. Experimental Procedure

In the experiment, each prompt is used to generate three images from each of the three selected AIGC tools, ensuring data representativeness. For platforms that allow parameter adjustments (e.g. Stable Diffusion), key parameters such as resolution, style strength, and CFG scale are kept consistent. For platforms with fixed default settings (e.g. DALL-E), the internal model characteristics are documented to minimize the impact of technical differences. All generated images are archived systematically according to "tool–prompt–cultural element" categories, with generation parameters recorded. This ensures data traceability and a systematic approach to analysis.

Figure 1. From left to right, the experimental results consist of text-generated images produced by DALL-E, Stable Diffusion, and Dreamina. The recorded data includes information on the tools used, prompts, cultural elements, generation parameters, and the generated images.

3.4. Analytical Methods

1. Quantitative Evaluation

To comprehensively evaluate the performance of different AIGC tools in cultural representation, stylistic diversity, and visual aesthetics, this study uses a quantitative evaluation approach that combines rating scales with statistical analysis. The creation of data recording tables ensures that subsequent analysis accurately reflects the tools' performance in handling diverse cultural elements.

- **Evaluation Metrics and Data Recording**
  To ensure objectivity, this study establishes three core evaluation dimensions: accuracy of cultural elements, aesthetic appeal, and stylistic consistency. Three experts with backgrounds in fashion design or cultural studies independently score each generated image. A five-point scale is used, with 1 being the lowest and 5 the highest. The specific evaluation dimensions are as follows:

Table 1. Scoring Dimensions for AIGC-Generated Images

Scoring Dimensions	Description	Score Range (1–5)
Cultural Accuracy	Assesses how faithfully the generated image reflects the cultural elements specified in the prompt (e.g., garment Pattern, color schemes, embroidery, or motifs)	1 (Very Low) – 5 (Very High)
Aesthetic Quality	Evaluates the overall aesthetic appeal, including garment design, color harmony, and detail richness	1 (Very Low) – 5 (Very High)
Style Consistency	Measures the consistency and variety of images generated under the same cultural theme across different AIGC tools	1 (Very Low) – 5 (Very High)

Each AIGC tool generates three sets of images for the same prompt, and the scores from all experts are recorded. All scoring data is stored in standardized tables, with the mean and variance calculated for each dimension to evaluate the overall performance of each tool.

- **Data Analysis Methods**
  In this study, scoring data is analyzed using mean calculations and variance analysis. First, the mean scores of each AIGC tool under different cultural themes are calculated to assess their overall capabilities in cultural representation and stylistic expression. Second, variance analysis is performed to examine scoring differences among tools under the same cultural theme. This further helps determine whether certain tools exhibit bias or inconsistent performance when handling specific cultural elements. This approach enables the identification of potential cultural biases in the generation process.

Table 2. Mean Calculation Statistics

AIGC Tools	Cultural Theme	Cultural Accuracy Mean	Aesthetic Quality Mean	Style Consistency Mean
DALL-E	China	2.11	2.44	2.67
Stable Diffusion	China	3.11	2.67	2.89
Dreamina	China	4.67	4.78	5
DALL-E	UK	3.67	3.22	3.44
Stable Diffusion	UK	4.56	4.44	4.56
Dreamina	UK	3	2.44	2.78
DALL-E	USA	4.78	3.67	4.67
Stable Diffusion	USA	3.89	2.89	3.67
Dreamina	USA	4.22	3.89	4.33
DALL-E	India	3.44	2.78	3.33
Stable Diffusion	India	3.33	3.22	3.56
Dreamina	India	4.11	4.67	4.56
DALL-E	Africa	2.89	3.44	2.67
Stable Diffusion	Africa	3.33	3.56	3.56
Dreamina	Africa	3.11	3.33	2.89

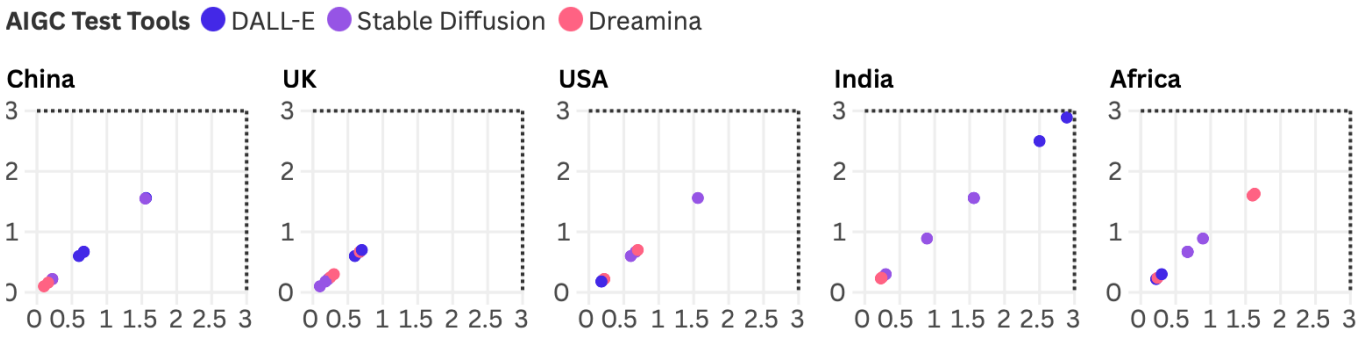

Figure 2. Variance Calculation Visualization. A smaller variance value, closer to the origin, indicates that the corresponding tool exhibits less bias in the given cultural context.

The mean calculations clearly illustrate the differences among various AIGC tools in their ability to represent distinct cultural backgrounds. For instance, Dreamina scored significantly higher in the Chinese cultural context, while DALL-E and Stable Diffusion demonstrated more consistent performance in the American and British cultural contexts. Variance analysis further highlights the preference differences of these tools when dealing with cultural elements. Specifically, Dreamina, developed by ByteDance, showed the lowest performance in the Chinese cultural bias test, whereas the British-developed Stable Diffusion scored higher for Chinese cultural elements. Meanwhile, Dreamina performed relatively evenly in Indian and African cultural bias tests. Stable Diffusion, despite being developed in the UK, recorded its lowest score in the British cultural bias test, while the US-developed DALL-E achieved the best performance in the American cultural bias test.

The results also reveal that the three AIGC tools displayed stronger inclusivity when handling Western mainstream fashion cultures, particularly British and American contexts. This indicates that these tools have a relatively accurate understanding of Western cultural elements, as reflected in bias coefficients that consistently remain within a range of 0 to 1, signifying low cultural bias. However, the performance across other cultural contexts—such as Chinese, Indian, and African—varied more significantly.

2. Qualitative Analysis

This study employs content analysis to qualitatively understand the visual details in AIGC-generated images, analyzing each tool's cultural representation and potential biases.

- **Content Categorization and Classification**
  Drawing on existing cultural theories and design analysis frameworks, this study organizes and classifies key visual elements from the generated images. The resulting classifications help quantify specific characteristics of bias or stylistic differences. The classification list is as follows:

Table 3. AIGC Content Analysis Framework

Visual Element	Cultural Feature Matching	Bias Potential	Description
Silhouette	√/×	Low / Medium / High	Whether the generated garment's shape matches the typical silhouettes of the target culture.
Color Palette	√/×	Low / Medium / High	Whether the output uses traditional colors from the specified culture in a logical and appropriate manner.
Patterns & Motifs	√/×	Low / Medium / High	Whether the motifs are faithfully reproduced from cultural prototypes and whether any misuse occurs.
Accessories & Embellishments	√/×	Low / Medium / High	Whether decorative elements are accurately portrayed from the target culture.
Stylistic Attribution	√/×	Low / Medium / High	Whether the AIGC output's style aligns with the prompt's cultural characteristics and whether there is stylistic confusion.

A checkmark (✓) indicates that the cultural feature is matched, while a cross (×) indicates that it is not. The potential for bias is assessed as "Low," "Medium," or "High" to reflect the degree of deviation.

- **Deviation Types and Cultural Bias Analysis**

Bias in Recognizing Cultural Elements

The study found that AIGC tools have varying levels of understanding of traditional clothing styles across different cultural backgrounds, particularly when it comes to specialized local fashion terminology. For example, the traditional Indian churidar, a uniquely designed tight-fitting trouser style, was misrepresented in test results as harem pants, bell-bottoms, or loose trousers, failing to reflect its original design features. Similar issues were noted with African garments such as Agbada and Dashiki. These discrepancies suggest that certain cultural fashion elements are not widely represented in global datasets, causing AIGC tools to struggle with accurately identifying these cultural symbols. In contrast, for widely recognized garments like Chinese hanfu and qipao, as well as Indian sarees, the tools produced more accurate results. This suggests that these elements are better established in the global fashion lexicon, leading to fewer biases. When it came to American stars-and-stripes motifs, Chinese red color schemes, and British tartans, the three tools performed consistently and accurately, showing virtually no bias.

Misuse of Cultural Symbols

Another observed issue was the misuse of cultural symbols in the generated outputs, particularly in garment construction and pattern design. For instance, DALL-E's interpretation of Chinese hanfu tended toward Japanese kimono styles, with notable differences in silhouette and collar design. Similarly, Stable Diffusion applied Western cutting techniques to the bustier section of hanfu. Patterns and motifs also demonstrated inconsistencies: dragon-phoenix motifs generated by Western tools often resembled Western dragons, differing significantly from traditional Chinese designs. Such cases highlight how AIGC tools, influenced by predominantly Western training data, may misinterpret deeply rooted cultural elements.

Homogenization of Styles

Beyond the misuse of symbols, the results also revealed a tendency toward stylistic convergence across different cultural contexts. For example, Dreamina, when generating Chinese, British, and Indian attire, showed some variation in color and silhouette but ultimately presented a similar overall style. The generated clothing often reflected a modern runway aesthetic, overshadowing the unique stylistic nuances of each cultural tradition. This indicates that Dreamina has limited adaptability to diverse cultural settings, often imposing a globalized design aesthetic on its outputs. Consequently, the resulting garments lacked the stylistic diversity inherent to their cultural origins.

Building on the content categorization and bias analysis, combined with quantitative scoring, this study will further delve into the psychological origins of cultural bias. It will propose strategies to enhance the cultural inclusivity of AIGC tools.

4. Analysis of the Causes of Cultural Bias in AIGC Design

Liu (2023) identified four main factors contributing to cultural bias: cultural assumptions, research tools, interpretive bias, and sample selection. Based on these factors, the cultural bias observed in AIGC tools can be summarized as follows:

4.1.Sample Selection: Cultural Bias in Training Data

AIGC models often rely on training datasets with imbalanced cultural representation. Western mainstream AIGC tools, such as DALL·E, MidJourney, and Stable Diffusion, primarily draw from U.S. and European internet data (e.g., Reddit, Pinterest), while Chinese AIGC tools rely on local Chinese-language resources (e.g., Baidu, Douyin). This imbalance in data sources causes models to favor dominant cultural styles when generating content related to non-mainstream cultures.

4.2. Research Tools: Influence of Algorithms and Pre-trained Models

AIGC models frequently use CLIP-based architectures to interpret text-image relationships. If dataset labels like “hanfu” are inaccurately associated with the corresponding images, the model may produce results that reflect these inaccuracies. For instance, if “hanfu” is linked to Western theatrical costumes or Japanese kimono styles, the generated images will reflect those biases. Additionally, when generating traditional Asian attire, some models fail to fully capture the rich tailoring, patterns, and materials unique to those garments, resulting in outputs that do not accurately reflect the intended cultural characteristics.

4.3. Interpretive Bias: Human Adjustments During Training

AIGC companies often fine-tune model outputs to meet market demands. For example, tools developed in the U.S. may prioritize Western aesthetic preferences, while those from China may be tailored more closely to domestic market expectations. While these adjustments improve user satisfaction, they can lead to oversimplified portrayals of traditional attire, making it challenging for the models to accurately reflect the historical and stylistic richness of such garments.

4.4. Cultural Assumptions: Influence of User Interaction and Feedback

The outputs of AIGC models are often shaped by user behavior and feedback. Western users’ preferences may lead models to present Chinese attire in ways that align more closely with Western mainstream aesthetic trends, potentially undermining the authenticity of traditional cultural details. This cultural assumption reinforces existing biases in AIGC models, steering the generated results toward expectations aligned with

Western markets, rather than accurately representing the unique characteristics of the target culture.

5. Global Inclusive Fashion Design Framework (GIFD-AIGC)

To address the cultural biases present in AIGC-generated global fashion design, this study proposes the Global Inclusive Fashion Design Framework (GIFD-AIGC). The framework consists of three core modules: data, algorithms, and design. Together, these modules form a multi-layered, dynamically optimized global cultural adaptation system.

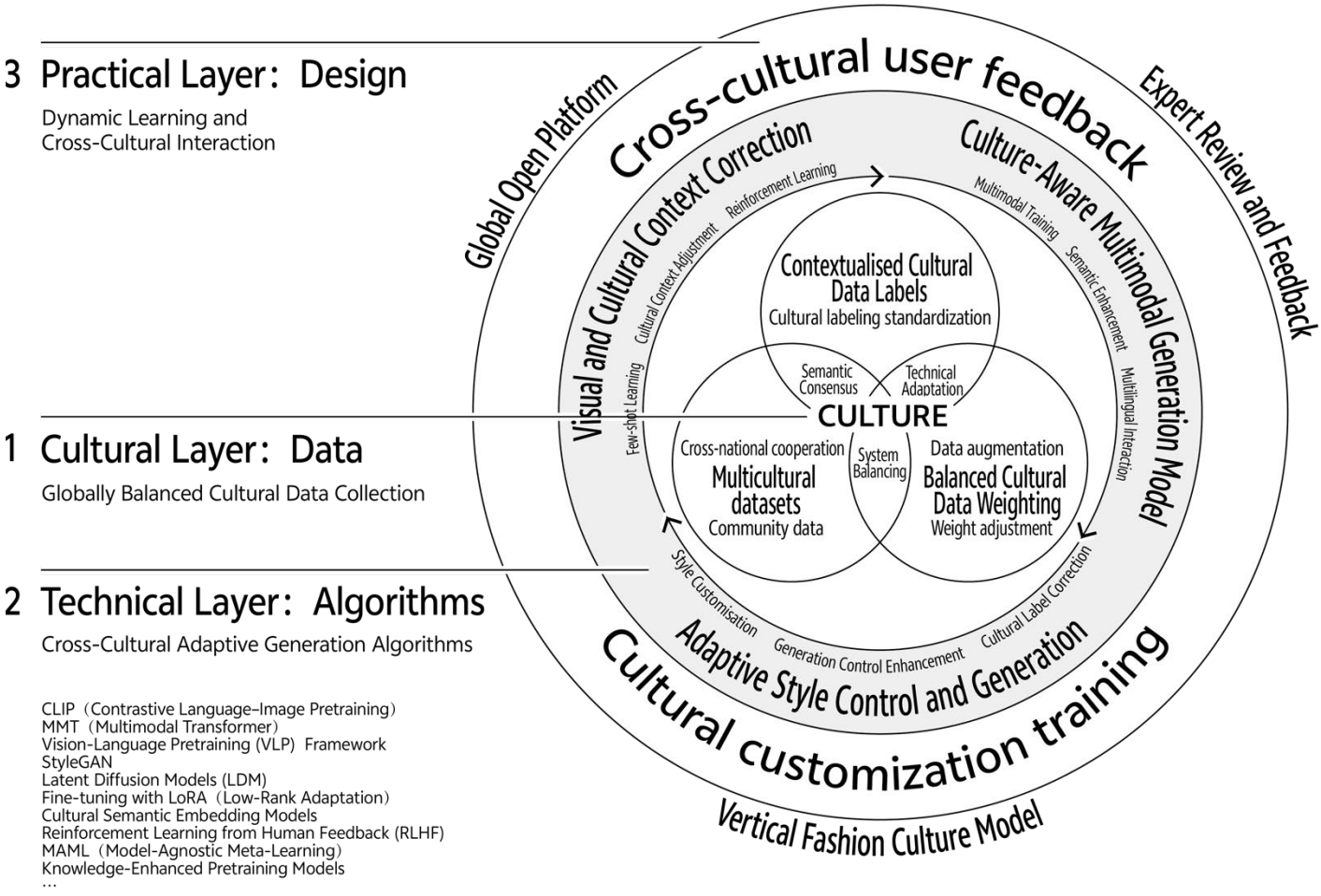

Figure 3. Global Inclusive Fashion Design Framework. Culture is the core of the entire framework, with the construction of a globally diverse cultural dataset as its foundation. Relevant algorithms and models provide technical support, while user practices and dynamic interactions serve fashion design applications.

5.1. Data as Foundations

At the data level, the framework focuses on building a diverse cultural dataset, standardizing cultural labels, employing data augmentation, and adjusting dataset weights to ensure diversity and balance. Collaborations with global museums and cultural institutions provide access to traditional clothing, patterns, and colors from various regions, which are integrated

into the dataset. Data augmentation techniques broaden the dataset's scope, enhancing the model's generalization capabilities.

5.2. Algorithmic as Guidance

On the algorithmic side, the framework adopts cross-cultural adaptation techniques using culturally-aware multimodal generative models, visual and cultural context corrections, and adaptive style controls. By leveraging multimodal learning and integrating large language models (LLMs) with latent diffusion models, the framework refines textual prompts to produce fashion styles that better represent multiple cultures, thereby reducing cultural bias. Visual and cultural context adjustments further align generated content with appropriate cultural backgrounds, avoiding misuse or stereotypes.

5.3. Design as Practices

For design practices, the framework incorporates cross-cultural user feedback and cultural customization training to enhance the model's dynamic learning capabilities and cross-cultural adaptability. Expert reviews and feedback from global users help refine generation outcomes. Additionally, user-driven customization training allows for the creation of designs tailored to specific cultural contexts. The continuous feedback loop embedded in the framework ensures ongoing optimization, enabling the model to maintain cultural inclusivity and adaptability in changing environments.

6. Results and Prospects

This study introduces a preliminary global inclusive fashion design framework aimed at addressing cultural bias in AIGC-based fashion design. By analyzing the causes of cultural bias, the study proposes a theoretical approach that includes constructing diverse cultural datasets, adopting cross-cultural adaptive generation algorithms, and enhancing user feedback. The core concept of this framework is to provide a multi-layered guideline for future AIGC models, helping them better adapt to the diversity of global cultural contexts.

Since this study focuses on the theoretical construction of the framework without empirical validation of its practical effects, it cannot be conclusively stated that the framework will significantly improve the cultural adaptability of AIGC models. However, based on the literature review and analysis, it can be inferred that this framework may offer a valuable reference point for future improvements to AIGC models. In particular, the framework holds potential as a theoretical foundation and implementation pathway for advancing the selection of cultural elements and generation strategies.

Future research could empirically test the framework's feasibility, such as evaluating its impact on AIGC generation performance using real-world multicultural datasets and assessing the effectiveness of the proposed multimodal learning, cultural context correction, and dynamic optimization mechanisms. Additionally, further studies could explore how to refine AIGC model training and generation processes in a globally diverse cultural landscape to support more inclusive fashion design innovations, thereby creating new opportunities for progress in the design field.

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DESIGN AND ANIMISM IN/THROUGH/OUTSIDE THE DIGITAL: LEARNING FROM KAUPAPA MĀORI AND THE DIGITAONGA PROJECT

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ABSTRACT |
It has been suggested that, while animism is fundamental to the ways humans deal with objects, the virtual magnifies these tendences, opening up spaces where matter has a vitality that is 'active, self-creative, productive, unpredictable' (Krebs, 2023; Marenko & Van Allen, 2016). As technologies become smarter and less visible, the extent to which users attribute personality, agency and intentionality to devices only intensifies (Marenko & Van Allen, 2016). At the same time, however, digital technologies are frequently designed by those working in contexts less connected with animist beliefs and practices.

By focusing on the case study of the Digitaonga research project, this paper explores what Kaupapa Māori approaches to digitisation could teach us about our entanglements in/through/outside of the digital. I describe the Digitaonga project, outline the unique taonga-led approach to digitisation that emerged through collaboration with Māori communities, and reflect on the ethics involved in this process. Drawing on these insights, I turn to look more broadly at how animism reveals itself in Western design contexts and how we can step into uncertainty and unpredictability to enable new human/non-human relationships to emerge. I conclude by exploring how an animist orientation may even mean challenging the notion of 'Design' itself.

KEYWORDS | ANIMISM, DIGITISATION, KAUPAPA MĀORI RESEARCH

1. Introduction

"What if the taonga don't want to be scanned."

Te Awhina Rangmarie Arahanga (Ngāti Tūwharetoa, Te Ati Haunui a Paparangi, Ngāti Hauiti ki Rata), Curator at Kaikoura Museum

The question raised by Te Awhina Rangmarie Arahanga above about the agency of taonga (prized Māori artefacts) marked a fundamental turning point in the Digitaonga research project, for which the project team and myself are forever grateful. Digitaonga is a project that explores the preservation, reconnection and repatriation of taonga Māori using emerging technologies such as 3D scanning, AI and blockchain. The first stage of the project worked with three groups of museums and Māori iwi and *hapū* (tribes and subtribes) to identify taonga that might be scanned to aid digital and/or physical repatriation. The project team included alumni, tech experts and Māori researchers. The question from Te Awhina Rangmarie Arahanga emerged from one of our first whakawhanaungatanga (establishing and developing collaborative relationships) sessions. It was a pivotal moment because it raised many questions about our approach and process. It called into question 3D scanning practices in museums whereby artefacts are routinely photographed or scanned according to size. It highlighted a different worldview whereby material things have a lively vitality and command an ethics of care towards them as matters of socio-political and spiritual significance. It practically demonstrated that taonga are ancestors. It led us to reflect on, and critique, Western binary notions including subject/object, human/non-human, nature/culture, digital/physical and original/copy. We reconsidered the ethics of our project. Indeed, what if taonga did not want to be scanned, and how would we know if this was the case.

This question also caused me to reflect on my own culture, research interests and experience. Originally from East Sussex in the UK, and having lived in Aotearoa New Zealand for 12 years, I am committed to becoming Tangata Tiriti (a person of the treaty) (Ngata, 2020). As a person, designer, and researcher I have always been interested in material culture, particularly how the value of artefacts gets made over time (Author, 2015). My feelings about the material world and its vitality resonate with the Māori worldview, and as I learn more I am indebted to Māori researchers and communities who have shared their knowledge. I believe that design has a lot to learn from indigenous communities and if we truly want to change design to be more socially and environmentally ethical then there is a wealth of inherited knowledge and practice to draw from. However, as designers from/working in Western contexts often disconnected from precapitalist/'premodern' pasts, can we learn from other worldviews without somehow turning indigenous knowledge into capital accumulated and attached to the possessive individual, or without appropriating concepts and taking them out of the context of their people, places and pasts. Can we humbly listen to indigenous approaches in order to reflect on our own ancestral and contextual knowledge and work towards design that "undermines its own ontological ground" (Fry and Nocek, 2021:3).

In this working paper, I aim to address some of these questions through the lens of animism using the case study of the Digitaonga project. I begin by defining animism and briefly documenting its etymology. I explore recent discussions of animism, digital technologies and design. I go on to describe the Digitaonga research project and outline the unique taonga-led approach to digitisation that emerged in partnership with Māori communities. I conclude by exploring how we can attune ourselves to an animist orientation in design education and practice, and how this may even mean challenging the very notion of 'Design' itself.

2. Animism, the Digital and Design

The term animism comes from the Latin root 'anima' which means "life, breath or soul" and emerged from Enlightenment philosophy which drew a distinction between the "a de-animated world of mere stuff" and human agency (Latour, 2014:8). Matter, as Victor Krebs writes, at least since the 17th century in the West, is conceptualised as:

> "inert, solid, measurable [...], quantifiable, subject to cause and effect and ontologically other to Decartes' res cogitans, which is, on the contrary, agentic, immaterial, and capable of manipulating and reconfiguring matter."
>
> (Krebs, 2023, p.1)

Animist, then, emerged as a term to describe cultures who did not view matter according to these binaries. It is most often attributed to the English Victorian anthropologist Edward Tylor in his book *Primitive Cultures* where he uses it to describe the belief that natural objects have souls. As such, the early origins of the concept are similar to fetishism, and reproduce the idea that cultures with animist worldviews are less "civilized".

Of course, as many anthropologists and ethnographers have reminded us, even in the Global North "people do not universally discriminate between categories of living and non-living things" (Ingold, 2006, p.10). This is because, as Tim Ingold has argued, the concept of animism is misleading "on two counts": firstly what has been described as animism is not a way of "believing about the world", but is a condition of being in it (2006, p.10). Animism, Ingold writes, is "a condition of being alive to the world", of being sensitive and responsive to environments in flux (2006, p.10). He continues:

> "Animacy, then, is not a property of persons imaginatively projected onto the things with which they perceive themselves to be surrounded. Rather — and this is my second point — it is the dynamic, transformative potential of the entire field of relations within which beings of all kinds, more or less person-like or thing-like, continually and reciprocally bring one another into existence. The animacy of the lifeworld, in short, is not the result of an infusion of spirit into substance, or of agency into materiality, but is rather ontologically prior to their differentiation."
>
> Ingold (2006, p.10)

This view of the world resonates with Bruno Latour's statement that we have "never been modern," which includes questioning the divide between a premodern animated world and a

modern de-animated one. This perspective also finds common ground with Giles Deleuze and Feliz Guattari, and the new materialists who draw from their work, who recognise that "materiality is always something more than mere matter", it is an "excess, force, vitality, relationality or difference that renders matter active, self-creative, productive, unpredictable" (Coole and Frost, 2010:9). It is this view of matter, as objects constituting themselves in "a transverse, vibratorial position, conferring on them a soul, a becoming ancestral, animal, vegetal, cosmic", that for Guattari offers potential to "decolonize" habitual ways of thinking, and destabilise the Cartesian dualisms central to social and environmental injustice (2000, p.102).

It is new materialist ontologies such as these that inform recent discussions of digital animism and animist design. For example, in *Digital Animism: Towards a New Materialism*, Victor J. Krebs argues that despite the abstraction of emerging technologies, somewhat paradoxically, it is our increasing interaction with the virtual world that is revealing the vital and transient nature of matter. Krebs observes that typically the virtual has been judged within a modern dualistic framework, as to how "close it comes to empirical experience" (2023, p.1). This results in two polarised stances – either the virtual is seen as fake, unreal or illusory and less than the "real", or it is seen as an upgrade to reality as "technology that can redeem us from a fallen world" (2023, p.2). He argues, however, that the virtual has more to do with force than simulation, it is potency or "a dimension of possibility inherent to all reality" (Massumi cited in Krebbs, p.4). Drawing on Deleuze, he suggests that the real and the virtual are two aspects of a constant inter-flowing phenomenon. It is this temporal movement and mutability that leads Krebs to argue that increased engagement with virtual digital worlds is providing tools to overcome "estrangement, reconceive matter and subvert the Enlightened secular stance of modernity towards the world" (2023, p.2).

The idea that people are becoming "animist" in order to deal with a world populated by artificial intelligence has quite a long history in interaction design. For example, as Betti Marenko (2015) notes, since the late 1970s, design theorists and critics such as Brenda Laurel and Erik Davis have been concerned with how pervasive computing induces animistic responses. Developing this line of thinking, Marenko argues that 'the current pace of digital innovation encourages the "consideration of the animate and inanimate assemblage in ways that were unthinkable only a decade ago" (2015, p.221). She goes on to argue, like Krebs, that "as a relational ontology, characterised by mutuality, emergence, and situated-ness, animism becomes a tool to explore our relationships to objects", and reassess and reconfigure our place in the world (2015, p.226).

In another article, Betti Marenko and Philip van Allen (2016) develop the notion of uncertainty-driven animistic design "as a strategic and experimental tool to rethink human–machine interaction" and document how animistic design feels in use. Through two speculative projects they consider how animism offers a way of thinking differently about interaction not from the perspective of the user, nor the object but "from the ongoing modulation of their less-than-predictable interaction" (2016, p.53). They identify several characteristics of animistic design which involve designing for "heterogeneous multiplicity" ('diversity of perspectives and behaviours embodied by multiple actants'), "embodiment" (physicality and tangible actions), and "distributed cognition" (thinking is in, and emerges from "*la milieu*") (2016, p.59-62). Marenko

and van Allen note that the idea of "data as actant" offers an interesting opportunity for further exploration. They give the example of a patient's medical data having a "unique personality that includes the owner's ethical rules, sharing/privacy protocols and history of use", which determine the way it would interact with external data systems (2016, p.64). Marenko and van Allen conclude by suggesting that animistic design, "can augment and sometimes replace the conventional, user-centered, solutionistic approach that we have today" (2016, p.68). These arguments resonate with many of the findings and reflections upon the Digitaonga project, which I now explore.

3. The Digitaonga Project and Approaches to Digitisation

As mentioned above, the first stage of the Digitaonga project worked with three groups of museums and Māori iwi and hapū (tribes and subtribes) to explore how emerging technologies such as blockchain and 3D scanning might aid in digital and physical repatriation efforts. The project was guided by a Kaupapa Māori research framework (informed by tikanga Māori — Māori values, practices, and ways of doing things) and co-design practices. Kaupapa Māori research is done by Māori, with Māori and for Māori, and this was implemented by employing a Māori research lead, Dr Moana Nepia who is an expert in Mātauranga Māori (Māori knowledge systems), as well as working with/and for Māori communities. The Kaupapa Māori research framework includes principles such as Whanaungatanga, the process of establishing meaningful, reciprocal and family-like relationships through cultural respect, connectedness and engagement; Māhaki, showing humility when sharing knowledge; and Mana, relating to power, dignity and respect (Tuhiwai Smith and Cram, 2018). Throughout the project we made sure we maintained these principles by working alongside our partners as they selected the taonga that they would like to scan, as they discussed the digital experiences they would like to create, and as they helped us to explore the ethics of data storage and security. In that sense, this project is a product of many people's ideas and we recognise that when people share their kōrero (thoughts and advice) the project becomes as much theirs as it is ours.

This ongoing collaboration led to, what we have termed, a taonga-led approach to digitisation. Taonga are a product of the quality of their relationships and are interconnected with every "word, thought, object, mineral, place and person" (Roberts, 2015). Taonga have their own mana, and kaitiaki (guardians) have the responsibility to uphold and protect their spiritual status and significance. The digitization of taonga Māori is by no means new and our project builds on a rich history of engagement with digital technologies by Māori iwi and hapū as well as museum curators. We have also looked to other indigenous digital repatriation projects for inspiration. For example, in a collaboration between the Smithsonian National Museum of Natural History in the US and the Tlingit community of Southeast Alaska a copy of a previously repatriated Kéet S'aaxw (Clan Crest Hat) was created and used in the museum in place of the original. The Tlingit community did not want to produce an exact replica, however, rather they preferred that the "copy" have some unique features (Hollinger et al, 2013, p.204).

This response to the largely Western idea of the 'copy' and the 'original' was also echoed in our discussions with Māori advisors, curators and whānau (family). Museum directors and curators suggested to us that the problem with current digitisation initiatives is that they are

conceptualised as a separate activities to contextualisation and storytelling rather than as extensions of taonga, with their own stories and identities inspired by, but not the same as, the originals. Thus, while we continue to strive for accuracy in high resolution scanning for preservation purposes, after that point, we are creating new interpretations, adding to layers of story-telling and cultural significance that already exist, to enhance the mana of taonga and their communities of origin. This perspective echoes the arguments of Krebs in which he writes that digital entities enter our world "not as copies that downgrade or upgrade reality' but as 'spontaneous and creative emergences" (2023, p.6). More broadly then, perhaps we should reconceptualise using "3D copying technologies" as they are sometimes called, as creative activities.

With this approach in mind, we reflected on how we would respond to the question that Te Awhina Rangmarie Arahanga asked us and how a taonga-led approach could be implemented in practice. At a high level, it meant that any decisions regarding digitisation and creative interpretation would be driven by the taonga and its kaitiaki (guardians). And if, for example, a particular taonga did not want to be scanned, we would remain open to consider alternative suggestions and responses, such as recording oral stories about the piece, or using a Māori artist to visually represent its form.

Figure 1. Whānau, curators and the project team with the korowai

This approach to digitisation looks different from typical scanning practices. For example, the

scanning of the Korowai (a Māori cloak) held at Kaikōura Museum took place over two days. On the first day of the two-day wānanga (meeting) we discussed the project's progress, the korowai and its history. The korowai was physically present with us during the discussion and the kaitiaki could connect with and feel its presence (Figure 1.). In the afternoon we visited locations key to the history of the taonga (Figure 2.). The whānau felt that scanning should go ahead and on the second day the korowai was photographed to create the 3D model. The whānau stayed to watch the process of photogrammetry and they were showed what would happen next to create the digital asset. The wānanga was closed by putting the korowai back on display in the museum and with a karakia (blessing) (Figure 3.).

While we were not aware at the time, this process resonates with the characteristics of animistic design that Marenko and van Allen identify. The open wānanga allowed for "heterogenous multiplicity" in terms of the involvement of multiple actors (human and non-human) with diverse viewpoints. The process allowed for embodied interaction: the people present were physically present in person with each other and the korowai. The two-day format also allowed for "distributed cognition"; knowledge emerged from the "intra-action" between the artefact itself, the kaitiaki, the project team, as well as the environments we visited, the sounds, smells and the weather we experienced.

Figure 2. Visit to Mangamaunu Marae where Tētahi Ropata created the korowai.

Figure 3. Whānau, curators and the project team after the karakia in the museum.

Not acknowledged by Marenko and van Allen however, is the spiritual realm in which we found ourselves. Our participants, the kaitiaki, were fully aware of the mauri (life force or essence) of the taonga and we were reliant on listening to them to ascertain whether and how we could go ahead with the process. This is listening in the broadest sense of the word, not 'hungry listening' that that fixes and fixates the person you are learning from (Robinson, 2020) but being sensitive to the feelings in the room however they are expressed. The closest thing, perhaps, from a Western secular perspective would be sensing the atmosphere or the vibe.

Discussions from the two-day wānanga also led to greater consideration of how the project would ensure Māori data sovereignty through data storage and security. We are currently building a digital platform that looks to organise, store and secure digital data and artefacts together in ways that resonate with the customary Māori practice of kaitiakitanga, the protection and care for taonga. This includes the protection of collectively owned information considered outside the paradigm of Western individualised systems of ownership, and affording taonga with the status of legal personhood as has been the case with Whanganui River, Te Uruwera, and Taranaki maunga (mountain) in Aotearoa. As Charles Dawson (2017) argues, the concept of a river having legal personhood is a "profound gift from Māori", because it demands and institutionalises a wider perspective on the world, one that prioritises kaitiakitanga over ownership. Similar to Marenko and van Allen's discussion of 'data as actant' this possibility could embed an ethics into data that would not exist otherwise in Western contexts and perhaps could further an acceptance of the vitality of matter more broadly.

4. (Not a) Conclusion: Animism and Design in/through/outside

of the Digital

However, what are the politics and ethics of these types of "gifts"? Indeed, should I be writing about the project at all without my Māori colleagues and collaborators. As I stated at the beginning of the paper, my motivation is not to appropriate or lay claim to Māori knowledge but to consider what might help design "undermine its own ontological ground" (Fry and Nocek, 2021, p.3). It is to reflect on what we can learn from worldviews that deny the separation of spirit and substance. Through the lens of animism and the Digitaonga project, I believe there are several insights that could be instructive for designers and design education:

- Animist approaches to the virtual challenge the dualisms of original/copy and digital/physical. As creative practitioners we should be more attune to the creativity of "3D copying" technologies, as well as the materiality of the digital, and the virtuality of the physical.
- Data has its own vitality, and animist approaches could ensure more ethical systems and conduct.
- An animist orientation that includes attunement to all the senses, embodiment and atmospheres could help designers to move beyond solutionism that often reinforces, rather than disrupts, Western constructs and binary dualisms.
- Animist approaches recognize and allow for distributed cognition, thinking that emerges in and from multiple human and non-human actors. This challenges the notion of predetermined outcomes or plans often central to design practice.

It is this last point in particular that may cause us to consider whether the term 'design' can be used to represent these sorts of emergent creative activities and practices. As Alfredo Gutiérrez Borrero (2021) argues, in adding more and more adjectives to the word design (co-design, pluriversal design, indigenous design etc), the noun itself is strengthened, and this reproduces the dominance of Western concepts and contexts over others. Gutiérrez Borrero doubts that the word design "which has advanced colonially over the planet, can be stripped of its colonial condition" (2021, p.48). He speaks of "dessobons", "designs with other names" to refer to creative activities whose "lineages do not respond, neither by etymology, epistemology, or ontology to the idea of design, because they arise from relational entanglements external to modernity, and are violated by incorporating them into it" (2021, p.47). Gutiérrez Borrero argues that "dwelling in incompleteness and separating ourselves from the referent [design], we notice that we are not talking about different perspectives on the same thing, but about different 'the same' recognizable in their incomprehensibility" to each other (2021, p.49).

I have felt this sense of incomprehensibility and unknowing through my engagement with the Digitaonga project. Instead of heading back into safety, I have tried to welcome an "animist cosmovision" and in turn look to how this manifests itself in Western approaches, histories, and environments (Akomolafe, 2023, para 1). For example, it is well documented how gentleman collectors in late-nineteenth and early-twentieth-century literature were challenged and destabilised by their collections (Allsop, 2013). Thus, perhaps we need to look to the vital materiality of creative activity to explore the radical possibilities that come with incompleteness and uncertainty. Rather than excluding that which doesn't fit, perhaps we should move into the generative space of not-knowing. Thus, rather than conceptualising the insights above as

'animist design', I hope they are useful for cultivating posthuman neo-animist sensibilities, which as Bayo Akomolafe (2023) has argued, may be able to help us move beyond reproducing ever more of the same.

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Design Justice and Hidden Violence in AI Voice Interfaces: A Critical Disability Perspective

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ABSTRACT | Despite growing integration of AI voice assistants into daily life, blind and visually impaired users frequently encounter exclusionary barriers in their design and use. While these systems promise accessibility, they often perpetuate subtle forms of hidden violence—design decisions that, though unintentional, systematically disadvantage disabled users. This paper adopts a critical disability perspective to examine how structural inequalities are embedded in AI voice interfaces. Drawing on five in-depth interviews with blind users and framed through theories of structural violence (Galtung) and design justice (Costanza-Chock), we explore how algorithmic bias, interaction design, and personalization deficits combine to marginalise blind users. Our thematic analysis identifies three core patterns: (1) biased speech recognition and linguistic exclusion, (2) rigid interactions and contextual breakdown, and (3) lack of personalization and loss of agency. These findings reveal how voice interfaces enforce normative assumptions about users—standard accents, visual confirmation, and simple commands—that exclude those who communicate or navigate differently.
Rather than treating these as isolated usability failures, we argue they reflect systemic design neglect and reproduce ableist structures. We call for a reorientation of voice interface development based on design justice principles: centring disabled users in co-design, diversifying training data, and embedding personalization as an ethical imperative. By reframing accessibility as a matter of justice—not just technical compliance—we illuminate how AI voice technologies can be reimagined to empower rather than marginalize. This paper contributes a critical, theory-informed lens to HCI and AI ethics, and urges a shift from designing *for* the "average" user to designing *with* those most affected. In doing so, we argue for a future where AI voice systems become tools of equity, dignity, and digital inclusion.

KEYWORDS | Design Justice; Structural Violence; AI Voice Interfaces; Accessibility; Critical

Disability Studies; Human–Computer Interaction

1. Introduction

Globally, an estimated 2.2 billion people live with visual impairments, which significantly impacts their daily activities. Voice-based artificial intelligence (AI) assistants (e.g. Amazon Alexa, Apple Siri, Microsoft Seeing AI) promise to enhance digital accessibility by enabling hands-free, eyes-free interaction. Such tools *could* alleviate burdens for blind and visually impaired users by increasing autonomy and independence. However, in practice these technologies often inadequately accommodate the diverse requirements of disabled users. Significant shortcomings persist: many AI voice systems fail to recognize non-standard speech, cannot handle complex tasks, or otherwise fall short of blind users' needs. These failures largely stem from systemic issues – for example, AI models trained primarily on data from non-disabled, "typical" users – leading to biased performance that deters adoption among people with disabilities. In effect, design and data biases built into voice interfaces end up *excluding* the very users who might benefit most, reinforcing a digital divide.

This paper examines these issues through the lens of critical disability studies and design justice. We contend that the subtle yet pervasive design flaws in AI voice interfaces constitute forms of *"hidden violence"* – structural harms that, while not overtly intentional, systematically disenfranchise blind users. Drawing on Johan Galtung's concept of structural violence, we understand "violence" here as social structures or processes that harm people by preventing them from meeting their needs or realizing their potential. Inaccessible technology design can be viewed as such violence "built into the structure" of digital systems, invisibly constraining and harming marginalized users. From a critical disability perspective, disability is not inherent to the individual but produced by environmental and design barriers. Thus, when voice interfaces are designed without regard for blind users, the resulting exclusions are a form of structural or *implicit* violence enacted through design.

Our investigation is informed by in-depth qualitative interviews (n=5) with blind users of AI voice assistants. Rather than a usability evaluation, we conduct a thematic, critical analysis of these interview narratives to uncover how biased design choices manifest as everyday barriers and "violent" exclusions. We situate our findings in the context of broader literature on design justice (e.g. Costanza-Chock's framework of community-led inclusive design), structural violence in technology, AI ethics and bias, and human-computer interaction (HCI) accessibility research. By adopting a thematic, argument-driven structure, we connect empirical insights to systemic critiques. The paper begins by framing relevant literature and theory, then outlines our interview methodology. We then present three major themes from our findings, illustrating how hidden design violence operates in voice interfaces. Finally, in the discussion, we critically examine these issues through design justice principles and propose how voice technologies might be reimagined to promote justice rather than perpetuate exclusion.

2. Literature Framing: Bias, Violence, and Justice in Design

2.1 Systemic Bias and Structural Violence in Technology

AI technologies are often touted as objective and universally beneficial, yet ample

evidence shows they can reproduce societal biases and inequities. Notably, much AI bias discourse has centered on race and gender, with far less attention to disability. This omission is significant, as disabled people have faced historical marginalization and exclusion from power and resources. Those patterns of marginalization become "imprinted in the data" used to train AI, embedding past discrimination into present systems. As a result, people with disabilities – often statistical *outliers* relative to normative data – are at heightened risk of harm from biased AI. In the context of voice interfaces, biased design might enforce standards of "normal" speech and ability that treat those outside the norm as problems. According to the social model of disability, widely endorsed in disability studies and codified in the UN Convention on the Rights of Persons with Disabilities (CRPD), disability is largely *"a social construction,"* arising from the mismatch between individuals and their environment. When mainstream technologies are built without regard to users with disabilities, they effectively create disability by imposing barriers.

Structural violence provides a lens to understand these design failures as more than accidental oversights. Galtung (1969) defines structural violence as harm perpetrated by social systems that unevenly distribute opportunities and agency. Crucially, it lacks a single identifiable perpetrator; instead, the "violence" is embedded in normal procedures and institutions. A classic example is when preventable social conditions (poverty, inequity) lead to suffering for certain groups. We can analogously view a poorly designed voice interface that consistently frustrates blind users as *"violence by design"* – an injury inflicted not by malicious intent, but by neglect and systemic bias. The constraints such technology places on blind individuals' communication and information access represent a preventable harm structured into the technology itself.

Importantly, biases in AI systems are not merely technical defects; they are symptoms of broader social biases and power imbalances in design. As researchers note, technological bias is "not simply an isolated technological failing, but rather a manifestation of larger social and design systems" that disproportionately disadvantage marginalized groups. For example, if a voice assistant performs well for users with standard American English pronunciation but poorly for those with different accents or speech patterns, this reflects whose voices were prioritized (and whose were ignored) in the design and training data. Such a biased system can deepen the *"gap in digital equity"* for blind users, especially since voice input is often more essential to them than to sighted users. Indeed, visually impaired people report using voice commands on mobile devices at higher rates than sighted users. Thus, when voice interfaces are biased or poorly designed for blind users, the impact is especially acute and structurally reinforced: those already marginalized by disability are further marginalized by technology, exemplifying how structural violence operates through design.

2.2 Design Justice and Critical Disability Design

Addressing these inequities requires rethinking design processes through the framework of design justice. *Design justice* is an approach that examines how design – of products, interfaces, infrastructures – distributes benefits and burdens among different groups, often along lines of existing oppression. Sasha Costanza-Chock (2020) and the Design Justice Network articulate this as focusing on the ways design can reproduce or challenge the "matrix of domination," the interlocking systems of oppression (such as white supremacy, heteropatriarchy, ableism, capitalism, etc.) that structure society. In other words, design justice asks: Who is design *for*, who participates in design decisions, and who is harmed or left out? It is both a theoretical lens and a growing social

movement aimed at equitable distribution of design's benefits and burdens, meaningful inclusion of marginalized communities in design, and recognition of their experiential knowledge. In the context of AI voice interfaces, a design justice approach insists that blind and visually impaired people – traditionally excluded users – must be centered in the entire design process. Costanza-Chock (2018) argues that centering marginalized users (e.g. blind people) in design and development is necessary to prevent technological systems from reproducing existing injustices. This means involving blind users in ideation, user research, prototyping, testing, and refinement of AI systems so that they become *"the driving force behind the final result,"* rather than treating their needs as an afterthought. Design justice thus flips the script: instead of designing for an abstract "average" user and forcing disabled users to adapt, it calls for designing *with* and *by* disabled communities so that their perspectives define the goals and criteria for success.

Such a shift aligns with principles from critical disability studies and HCI that emphasize participatory design and disability-led innovation. Echoing Costanza-Chock, researchers have noted that AI systems should be developed to *help marginalized populations resist systemic bias rather than defaulting to the needs of a "typical" user*. When designers default to a hypothetical average user (often assumed to be sighted, able-bodied, using a dominant language), they implicitly encode the matrix of domination into technology by privileging those already privileged. In contrast, a justice-oriented design would treat, for example, a blind person with a regional accent as a primary stakeholder whose use case is just as important as any other. Centering such users could prevent many biases at their root. For instance, if blind users had been heavily involved in designing voice assistants, issues like lack of speech output for certain prompts or inability to adjust speech speed might have been caught and addressed early. The human-centered AI perspective also reinforces this: as Wang (2020) posits, AI design must develop a deep understanding of the end-user's lived experience. For blind users, that means AI assistants (whether visual recognition tools or voice agents) need to be *customized to fit their daily challenges* and contexts. Personalization and flexibility are not just nice-to-have features but ethical imperatives when designing for disability, because a one-size-fits-all approach will tend to fit only the non-disabled majority.

2.3 AI Ethics, Fairness, and Voice Accessibility

There is a growing recognition in the AI ethics community that fairness and accountability efforts must include disability axes. Algorithmic bias discussions have often omitted disability, but recent work is correcting this. For example, Trewin et al. (2019) outline considerations for AI fairness for people with disabilities, highlighting issues like representation in training data, accessible model evaluation, and inclusive user testing. Similarly, Guo et al. (2020) call for a research roadmap toward fairness in AI for people with disabilities. A major insight from such work is that many biases affecting disabled users arise not only from algorithms per se but from design decisions around how problems are framed and who is included in development. Newman-Griffis et al. (2023) demonstrate that definitions of disability built into AI systems (e.g. treating disability via a medical-deficit model vs. a social model) lead to very different design choices and downstream biases. They further show that a *lack of disabled participation and transparency in AI design amplifies these harms*. In other words, bias often "begins at the beginning" – in problem formulations, data collection, and interface design choices made without the input of disabled people. This underscores that inclusive processes (who gets a say in design) are as crucial as inclusive outcomes.

Within HCI, research on voice interfaces and accessibility provides valuable context. Voice

assistants have emerged as unintended assistive technologies for many people with disabilities – *"accessibility came by accident,"* as Pradhan et al. (2018) famously titled their study. In that work, the authors found that users with various disabilities adopted commercial voice-controlled assistants (like Amazon Echo) to help with everyday tasks, despite those products not originally being designed with disability in mind. Blind users, for instance, use smart speakers to get information or control devices without needing visual UIs. However, because these devices were not *intentionally* designed for them, users often encounter frustrating limitations. Recent studies have catalogued challenges such as voice assistants failing to recognize screen reader users' fast speech rates, difficulties in discovering accessible features, and the tendency of some devices to provide visual output or cues that blind users cannot perceive. Oumard et al. (2022) provide an overview of current voice user interface requirements for blind and visually impaired users, noting that many needs – from better feedback to advanced query handling – remain only partially met by mainstream products. In short, the literature suggests a gap between the *potential* of voice AI to empower visually impaired people and the *reality* of exclusionary design in today's systems. This gap is maintained by structural factors: whose voices are heard in design, what data is used, and which use scenarios are prioritized. Disability, Bias, and AI, a 2019 report by AI Now Institute, argues that centering disability in AI development not only surfaces these gaps but points the way to remedies. By moving beyond a narrow focus on technology as a "solution" and instead accounting for social context, history, and power structures, we can begin to address the root causes of bias in technologies like voice interfaces. These insights from prior work guide our analysis of how *hidden design violence* operates in AI voice interfaces and how a design justice approach could transform these technologies.

3. Methodology: Interviews and Thematic Analysis

To investigate the lived experiences behind the abstractions of bias and injustice, we conducted an empirical study based on qualitative in-depth interviews with blind users of AI voice interfaces. Five participants (n=5) who are blind or severely visually impaired were recruited through local disability advocacy networks. Each participant was a regular user of at least one voice-based AI assistant (including platforms such as Amazon Alexa, Google Assistant, or smartphone voice assistants) in their daily life. We used a semi-structured interview format, allowing participants to freely describe their usage patterns, preferences, and the challenges or frustrations they encounter with these technologies. Example prompts included: "Can you walk me through how you use voice assistants in a typical day?", "Have you had instances where the assistant misunderstood you or couldn't do what you needed? How did that affect you?", and "If you could change anything about these voice assistants to make them work better for you, what would it be?" Such open-ended questions encouraged participants to reflect on not only usability issues but also how using (or struggling with) voice assistants made them *feel* and fit into their broader life.

Interviews lasted approximately 45–60 minutes and were conducted one-on-one via audio call. Audio recordings were transcribed verbatim for analysis. We then employed a thematic analysis approach to code and interpret the data, following standard qualitative procedures for identifying patterns across narratives. Initially, two researchers independently reviewed the transcripts and generated open codes for notable concepts (e.g. "misrecognition of speech", "feeling of not being heard by device", "workaround strategies", "privacy worries"). We then collaboratively grouped related codes into candidate themes reflecting higher-level concepts. Through iterative discussion and refinement, three primary themes emerged that captured recurrent experiences and critiques voiced by participants. These themes were: (1) **Biased Speech Recognition and**

Linguistic Exclusion, (2) **Rigid Interactions and Contextual Breakdown**, and (3) **Lack of Personalization and Agency**. We interpreted these not just as usability problems, but as *manifestations of hidden structural violence* in design, aligning each theme with the critical frameworks discussed earlier. To ensure trustworthiness of our analysis, we engaged in reflexive comparison with existing literature (as described in the Literature Framing) to see how our emergent themes resonated with or differed from known issues. The small sample size means our goal is depth of insight rather than generalizability; we aimed to uncover rich, illustrative examples of how design shortcomings are experienced by blind users. All participants gave informed consent, and pseudonyms are used to protect their anonymity in reporting. In the following section, we present the themes with supporting evidence from interviews, analyzing how each reflects a form of "hidden design violence" embedded in current voice interfaces.

4. Thematic Findings: Hidden Design Violence in Voice Interfaces

4.1 Finding 1: Biased Speech Recognition and Linguistic Exclusion

Participants unanimously reported issues with voice assistants misunderstanding their speech, in ways that pointed to biases in speech recognition algorithms. Several interviewees observed that the system seemed tuned to *someone else's voice*, not theirs. For instance, one participant who is a non-native English speaker described frequent failures: *"I have to repeat myself multiple times, or try speaking like an American newscaster, just to be understood."* This experience reflects how current voice AI often struggles with diverse accents, dialects, or speech patterns that deviate from the "standard" language model. Indeed, voice recognition systems are typically trained on large datasets of speakers, but if those datasets underrepresent linguistic diversity (regional accents, non-native pronunciations, atypical speech from disabilities), the model will perform poorly for those voices. Research confirms that mainstream speech recognizers work best for "mainstream" speech and can be ineffective for atypical speech, implicitly excluding many disabled users. In our interviews, this translated into a feeling of *linguistic alienation*: participants felt "the assistant doesn't understand people like me." One interviewee, who speaks quickly and uses screen readers at high speed, noted that the voice assistant often failed to keep up: if they spoke a command as fast as they comfortably could, the system would either misinterpret it or not respond at all. This resonates with prior findings that visually impaired users often listen to and produce speech at higher rates, whereas voice AIs aren't optimized for such speeds.

The *consequence* of these recognition biases is more than just inconvenience; it is exclusion from effective use of the technology. Participants described scenarios where they simply gave up on using a voice command because "it's just not getting what I say." One participant said, *"It makes you feel a bit invisible – like I'm speaking, but it's as if I'm not there."* This emotional impact illustrates how a biased algorithm can erode a user's sense of agency. From the user's perspective, the system's failure to recognize their voice is experienced as a form of rejection or neglect. In design justice terms, the benefits of the technology (quick information access, hands-free control) are not equitably distributed; instead, the harms (frustration, time loss, psychological stress) fall more on those with certain speech characteristics. The exclusionary pattern is systemic: users with accents or speech differences have to *adapt to the machine*, rather than the machine adapting to them – a subtle form of oppressing the user. Prior work has identified this as a broader issue: AI voice assistants tend to enforce implicit standards of "normal" speech, treating

those who don't fit as outliers. The cost of being an outlier is clear in our data – repeated errors, longer interaction times, and sometimes abandonment of the technology. As one study aptly noted, bias in voice interfaces goes beyond simple recognition errors to create a "broader pattern of exclusion." Users with language barriers, strong regional accents, or non-standard pronunciations often experience chronic misinterpretation, unless they artificially change how they speak. This need to code-switch or overly enunciate every command is itself a burden that sighted, non-disabled users don't face – effectively a *tax on disability*. Moreover, when the assistant fails, blind users lose time and patience. Our participants echoed what has been reported elsewhere: *"I'll ask Alexa to do something, it messes up, I try again and again… by the third time I'm just frustrated"*. Such iterative failures act as a hidden barrier, slowing down interactions and undermining the purported efficiency of voice interfaces. In sum, biased speech recognition exemplifies hidden design violence: an ostensibly neutral feature (the AI's listening ability) becomes a mechanism of marginalization when it consistently works better for the majority and worse for an already disadvantaged minority.

4.2 Finding 2: Rigid Interactions and Contextual Breakdown

A second prominent theme was the rigidity of voice assistant interactions, particularly the inability to handle multi-step or context-dependent tasks, which often led to user frustration and abandonment of tasks. Participants shared numerous instances of hitting a "wall" with the assistant's limited dialogue memory. Unlike human conversation, where context carries over, current voice interfaces typically require each command or query to be largely self-contained. One interviewee recounted an experience trying to get information piece by piece: They first asked for a famous person's birthdate, and the assistant provided it. Then they naturally followed up with "How old is he now?" – a question that clearly refers to the person just mentioned. The assistant, however, responded with *confusion* or an irrelevant answer because it did not retain the prior context of who "he" was. This lack of contextual understanding forced the user to rephrase the question with the person's name again. The participant described this as *"tedious and annoying – I feel like I have to babysit the assistant through every little step."* Such frustration with having to constantly repeat context was common. In fact, an exploratory study of conversational agents similarly noted *"frustration over the lack of context memory and the obligation to constantly repeat context to Alexa"* among users. Our interviews mirror that finding: voice assistants often forget what was just said, and the onus falls on the user (even a blind user juggling other tasks) to formulate each query from scratch.

For blind users, this rigidity can be particularly limiting. Many said they wished to accomplish *compound tasks* by voice – for example, "find my nearest pharmacy and call it," or "open my email and read the first unread message." Instead, they must break tasks into discrete steps and sometimes switch to other tools. One participant remarked that after a certain point of back-and-forth with the assistant, *"I just sigh and pull out my laptop with a screen reader because it'll be faster."* Inaccessibility thus isn't always a binary inability to use the tool at all; it often manifests as the technology being so cumbersome that the user opts for an alternative. Here we see hidden violence in design as the extra "time tax" and cognitive load imposed on disabled users by an inflexible system. The requirement to constantly restate contexts or simplify requests to fit the machine's limited understanding is an inequitable burden: sighted or non-disabled users might simply use a screen or find another workaround more easily, whereas a blind user trying to stay within voice interaction is stuck with an inferior experience. This *sequential command failure* reflects designers optimizing for simple, single-shot commands (turn

on light, set timer) while neglecting more complex, real-world scenarios that are important for users' autonomy. Studies have observed that many commercial voice assistants are indeed optimized for short, shallow interactions and their performance "decreases significantly when handling advanced, personalized interactions that require understanding of user intent and context". Our participants' experiences put lived experience behind that statement – they encounter a structural limitation where the design does not accommodate chaining commands or maintaining conversational state, which in turn *prevents* them from accomplishing certain goals efficiently.

From a design justice viewpoint, this reveals a misalignment between the design assumptions and the needs of blind users. The inability to process sequential or contextual commands can be seen as a form of *structural discrimination*: the system's design assumes users can fall back to visual interfaces or are only interested in simple tasks. Those assumptions exclude a whole class of use cases particularly relevant for blind users who might prefer a continuous voice dialogue for complex tasks. One participant gave an example of trying to manage a calendar appointment via voice. They could ask "What's on my calendar for tomorrow?" and get an answer, but if they then said "Schedule a meeting with John in that free slot," the assistant would fail to connect the dots (who is John? what slot?). The user has to query availability, then separately issue a new command to schedule, specifying all details again. This cumbersome process reflects a lack of *assistive intelligence* in what should be an assistive technology. It subtly diminishes the user's agency – instead of commanding one's assistant to handle a task smoothly, the user is micromanaging the assistant. As one focus group participant in another study lamented, after the assistant failed to remember context, *"in the beginning it is fun… but after a while you just want it to do the things you bought it for and not some senseless gimmicks"*. In our analysis, the hidden violence here is the erosion of trust and confidence: the user cannot rely on the system to follow through, so they either perform undue labor to use it or abandon its use for that task. This erodes the promise of independence that AI assistants are supposed to offer. In effect, the design's inflexibility *privileges* certain interactions (simple, stateless queries) while marginalizing the more complex, context-rich interactions that many disabled users actually need for daily life. The outcome is a slower, more frustrating experience for the blind user – a systematic disadvantage built into the interaction design.

4.3 Finding 3: Lack of Personalization and Loss of User Agency

The third theme from our interviews is a pervasive lack of personalization or adaptability in voice interfaces, which contributes to a feeling of disempowerment among blind users. Participants noted that current voice assistants tend to treat all users the same, offering little ability to tailor the system to individual needs or preferences – and in doing so, they implicitly center an able-bodied user profile as the default. One interviewee put it bluntly: *"These devices weren't made for me. I'm just adapting to them."* This sentiment captures how the absence of customization options or adaptive behavior forces blind users to conform to the technology, rather than the technology accommodating them. Specific examples raised by participants include: speech output speed and verbosity**,** content of responses**,** and interaction modalities. Several blind users are power users of screen readers and are accustomed to very high speech rates (far above typical speaking speed). Yet voice assistants often have a limited range of speed adjustment – for instance, a participant noted that their smart speaker's fastest talking speed was still much slower than they would like. This meant they had to listen to responses at a plodding pace, which made interactions needlessly time-consuming. Research on speech rate preferences confirms this mismatch: visually impaired users often desire

faster speech feedback than what commercial voice agents provide. When a system cannot personalize something as fundamental as speech rate, it effectively penalizes users who could otherwise operate more efficiently.

Another aspect is the *content and format* of the assistant's responses. Participants mentioned that sometimes the assistant gives overly generic or unhelpful responses that aren't what they actually need, and there is no way to change that behavior. For example, when asking a device for the time or weather, a sighted user might glance at a screen or have a short response suffice. A blind user might prefer more detail in certain answers (since they can't quickly scan additional info visually). One participant described asking a voice assistant about bus schedules and getting an answer that "there are multiple buses in the next hour," which was not specific enough – but the device did not offer an easy way to refine or personalize the response format. Similarly, participants felt that assistants did not learn from repeated interactions. If a user always asks for a specific radio station in the morning, the system does not proactively offer it – the user must ask every time. The technology thus lacks *adaptive learning* that could improve the user's experience over time. This failure to adapt or allow personalization was interpreted by users as a sign that their individual needs were not accounted for in design. In critical disability terms, it is an expression of ableism in design – the tacit expectation that all users have the same needs as a non-disabled person, so features for customization are not prioritized.

The lack of personalization also ties directly to loss of user agency. Agency in using technology means the user feels in control and that the tool can be configured to serve their goals. Our participants often felt the opposite: constrained by the device's fixed settings and behaviors. One described it as, *"I work around the device's quirks, instead of it working around mine."* This inversion of control is a hallmark of *non-inclusive design*. It can be viewed as a structural issue: mainstream design processes often define a singular user experience deemed acceptable (often based on majority feedback or assumptions), and those who fall outside that norm are expected to cope. From a design justice perspective, this reflects a failure to equitably distribute the *benefits* of design and minimize the *harms*. The benefits of personalization – efficiency, comfort, relevance – are part of the "distribution of benefits" that design justice advocates examine. When blind users cannot get the same level of personalized service from an AI that others might get (or that would meaningfully improve their access), it is a form of marginalization. Costanza-Chock notes that design justice requires fair and meaningful participation in design decisions. Had blind users been meaningfully involved, many of these personalization features likely would have been highlighted as priorities rather than left out. For instance, a blind co-designer might insist on a mode where the voice assistant gives more contextual feedback or confirms actions verbosely for users who can't see a confirmation light – features that currently often have to be enabled via tedious settings or are absent.

Encouragingly, one of our participants had experience with a beta feature on a voice assistant that allowed custom voice commands to be programmed (effectively letting the user create shortcuts or aliases for complex tasks). They found this empowering: *"It finally felt like I could teach it something."* This suggests that when given tools for personalization, disabled users can significantly enhance their own experience – essentially performing "crip technoscience" or user-led innovation to hack the tool for their needs. However, such features are rare and not well-supported in most mainstream voice interfaces. The norm remains a *"one-size-fits-all"* design that in truth fits only the majority, reflecting what one might call the tyranny of the typical. As Costanza-Chock (2018) observed, the aim of design justice is to avoid defaulting to the needs of a "typical"

user and instead build for the full range of human diversity. Our findings reinforce how far current design is from that ideal: voice AI systems still largely default to abled norms and treat the disabled user as an edge case. This not only limits functionality but, in a deeper sense, is *symbolically violent*. It sends a message – however unintended – that the needs of blind users are not important enough to warrant special consideration in the design. In critical disability theory, such neglect is a form of symbolic annihilation of disability in tech culture. While not an overt harm, it contributes to feelings of otherness and lack of belonging in a digital world that touts AI as a progressive force. The hidden violence here is subtle but pervasive: it lies in every instance of a blind user thinking "I guess this thing wasn't made for people like me."

5. Discussion: Toward Design Justice in Voice Interfaces

5.1 Reframing Design Failures as Structural Violence

Our findings illustrate how seemingly minor design, and algorithmic decisions can accumulate into patterns of structural inequality in user experience – what we term "hidden violence" in AI voice interfaces. The term is apt because the harms (frustration, exclusion, loss of agency) are often invisible to those not experiencing them, and there is no single culprit to point at. Yet, as Galtung's theory of structural violence reminds us, the absence of an obvious perpetrator does not mean the absence of violence; it simply means the violence is woven into the fabric of the system. In the cases above, the "system" includes the data pipelines that underrepresent diverse voices, the design processes that ignore disabled perspectives, and the business priorities that fail to value accessibility. These combine to create technology that *systematically* under-serves blind users. Each time a blind person is forced to repeat a command thrice due to accent bias, or to abandon a task because the assistant can't follow context, that is a small cut – an instance of *"slow violence"* in Rob Nixon's terms. Cumulatively, these cuts constrain the user's ability to live and thrive in a digitally mediated world. Slow violence, as applied by Teo (2024) to AI, describes harms that are incremental and accrete over time, often ignored by mainstream narratives of innovation. The experiences our participants shared – the daily hassles and indignities – exemplify AI's slow, hidden violence to the rights and dignity of disabled persons.

5.2 Design Justice as a Framework for Inclusion

Understanding these issues through a critical lens highlight that the problem is not *poor blind users need better tools*, but rather *power imbalances and exclusions in how technology is designed*. This is where design justice offers both critique and a way forward. Design justice tells us to ask who has voice and power in the creation of voice interfaces. Currently, it appears that blind users have had little say: they were not the assumed end-user during design, and perhaps not significantly included in testing either. The result is a classic case of what Costanza-Chock calls *"matrix of domination"* being encoded in design. The matrix here might include ableism (privileging able-bodied communication styles), but also commercial and time pressures that prioritize quick deployment over thorough inclusive design. By centering blind users moving forward, we can begin to dismantle this matrix within voice technology.

5.3 Participatory Design and the Redistribution of Design Power

Inclusive co-design and participatory methods are crucial. If blind users are co-creators of voice assistants, the design requirements would likely expand to include context retention, flexible speeds, alternative interaction flows, etc., from the outset. This aligns with broader calls in AI ethics to center the voices of those most impacted by AI systems. For instance, the AI Now Institute emphasizes learning from disability activism – such as the principle of "nothing about us without us" – in working toward AI accountability. In practical terms, companies developing voice AI could establish advisory panels of users with disabilities, conduct targeted user research in the blind community, and employ disabled designers or engineers who bring lived experience into the product development. Such steps move us closer to what Whittaker et al. (2019) advocate: *centering disability in discussions of AI to account for social context, history, and power structures*. By doing so, we shift from viewing accessibility as a narrow technical fix to seeing it as part of a justice-oriented transformation of technology culture.

Our analysis also underscores the need to adopt what scholar Ruha Benjamin calls a "people's perspective" on technology, wherein the aim is not simply to *fix* biased systems but to question who builds, owns, and governs these systems in the first place. The notion of "justice by design" implies that fairness and inclusion should be baked into the entire lifecycle of technology creation. In the context of voice interfaces, this could mean implementing guidelines that require diverse training data (including voices of people with different disabilities and linguistic backgrounds) and auditing models for performance disparities across user groups. It could mean enforcing accessibility standards that go beyond minimal compliance (for example, requiring that any function available via an app or screen is equally available via voice feedback for blind users). It certainly means *listening* to disabled users' accounts of harm and taking those as seriously as bug reports or feature requests from other users. The fact that our participants' struggles are not widely recognized as "bugs" is itself telling – it reflects a societal bias in whose experiences are valued. Design justice pushes us to validate those experiences and treat them as actionable knowledge.

5.4Implications for AI Policy, Practice, and Ethics

Another dimension in discussion is the role of policy and structural interventions. If we view the exclusion of blind users from voice tech as a form of structural violence, then like other forms of structural inequality, it may require structural remedies. Anti-discrimination law and accessibility regulations can play a role. For example, the Convention on the Rights of Persons with Disabilities (CRPD) obligates states to promote accessible technology and eliminate barriers. This could translate into stronger enforcement of digital accessibility standards or incentives for inclusive innovation. While tech companies often tout AI fairness and ethics commitments, disability inclusion should be explicitly incorporated into these frameworks. Currently, issues like model bias for accents might be seen as secondary performance issues; a justice lens insists they are primary equity issues.

In discussing these findings, we also acknowledge the intersectional nature of design justice. Within the blind community, there is diversity of language, race, gender, socioeconomic status – and these intersections can compound disadvantage. For instance, a blind user who is also a non-native speaker or from a minority ethnic group might face even greater misrecognition from a voice assistant, as some of our participants did. A design justice approach in AI would thus be attuned to intersectionality, ensuring that the most marginalized (e.g., blind users and speakers of

underrepresented languages) are centered. This approach resonates with black feminist theory on centering the margins to liberate everyone. If voice interfaces were designed to robustly handle the needs of a blind, non-native speaker, for example, it's likely they would be more robust and flexible for all users. In that sense, inclusive design can drive innovation that benefits a wider user base – but the motivation must first be ethical (justice), not just market expansion.

In summary, the discussion highlights that hidden design violence is not fate. It is the result of choices – often unconscious or externally constrained – in the design and deployment of technology. By surfacing these issues and reframing them as questions of justice, we open up possibilities for change. Centering disabled users, diversifying design teams and data, and holding technology accountable to inclusivity are key strategies. Our findings serve as a reminder that bias in AI is not only an algorithmic issue but a design and development issue. The inequities experienced by blind voice assistant users are solvable but solving them requires shifting power and priorities in tech design. The next section turns to concrete implications and recommendations stemming from this critical perspective.

6. Limitations

This study offers an in-depth, critical examination of how AI voice interfaces exclude blind users through design decisions embedded with systemic bias. However, several limitations should be acknowledged. First, the study is based on in-depth interviews with five participants, which, while suitable for qualitative thematic analysis, limits generalisability. The sample size reflects a goal of depth over breadth, but the experiences documented may not fully represent the diversity of blind and visually impaired users, particularly across different age groups, technological proficiencies, and regional contexts.

Second, all but one participant were based in China, with one based in the United Kingdom. This geographical concentration may introduce cultural or infrastructural biases—such as differences in device availability, voice assistant performance in Mandarin vs English, and accessibility policies—that shape user experience. Future research should explore cross-cultural comparisons to further unpack how sociotechnical contexts affect the manifestation of hidden design violence.

Finally, this study focused exclusively on blind users. While this lens was necessary to foreground visual accessibility issues, it does not account for how other disabled populations (e.g. people with speech impairments, cognitive disabilities, or intersecting marginalisations) may interact with or be excluded by voice interfaces. Further research is needed to explore how overlapping forms of exclusion operate in AI design, and how inclusive strategies can be adapted for a broader range of users.

Despite these limitations, this study contributes critical insights into how AI systems can unintentionally replicate structural inequities, and how design justice offers a pathway for more inclusive and empowering voice technologies.

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ethical leadership
a new frontier for design

Designing for Comprehension: Ethical Considerations in AI Collaborative popular science images for Adolescents

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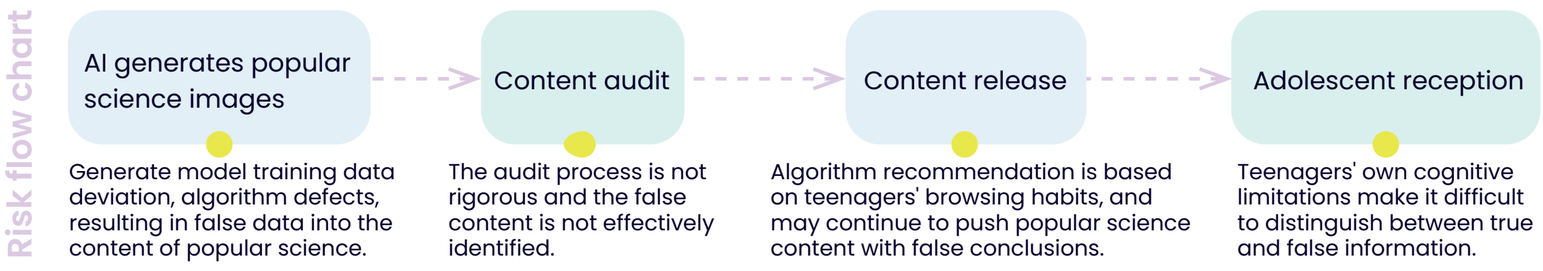
Abstract

With the emergence of AI-generated content (AIGC) technologies, the landscape of information dissemination is rapidly evolving (Anantrasirichai & Bull, 2020). In the diverse field of popular science communication—that is, in the popularization of scientific knowledge—images are omnipresent (Hüppauf & Weingart, 2008). AIGC has the potential to transform how science popularization images are created and consumed, offering new opportunities for engagement and learning (Chen et al., 2020). However, as these technologies become more integrated into educational contexts, designers and educators face significant challenges (Zhang & Aslan, 2021) in enhancing the acceptability and comprehensibility of such materials among diverse audiences, particularly adolescents. This demographic is increasingly exposed to digital media, yet their ability to critically engage with and understand AIGC varies significantly (Yue et al., 2022). This study aims to investigate how adolescents comprehend and embrace AI collaborative science popularization illustrated information design, underscoring the significance of ethical design within the context of the science information environment. The research employs the SATAI (Student Attitudes Toward AI) (Suh & Ahn, 2022) scale to assess adolescents' attitudes and acceptance of AI-generated popular science images, with participants drawn from three different regions. This research provides empirical insights that inform designers in promoting user welfare and social responsibility within the scientific information environment, thereby advancing ethical considerations and innovative practices in design. The ultimate objective is to achieve equity, trust, and inclusivity, while supporting the sustainable development of science education.

Background

As an efficient tool of information dissemination, popular science images play a crucial role in visualizing scientific knowledge. Traditionally, the creation of such images relied on manual drawing or photography, a process that was both time-consuming and costly. However, the emergence of AIGC technology has revolutionized this field. It enables the rapid generation of images in diverse styles and themes. This significantly improves creative efficiency, reduces production costs, and provides science communicators with greater creative freedom.
Meanwhile, the growing unreliability of scientific literature raises concerns, as it is often filled with false figures, fabricated data, and misleading conclusions that are hard to detect. For adolescents, who are a key audience of popular science materials, these issues present unique ethical challenges. Adolescents, with their incomplete cognitive development, differ from adults in moral judgment, leading to varying levels of critical thinking and discernment. Regardless of intellectual ability, they lack the autonomy and responsibility of adults. Therefore, AIGC guidelines for adolescents should not simply extend general user rules or cater to vulnerable groups but instead address their specific needs and vulnerabilities.



Research objectives

This paper explores adolescents' perspectives on AI-generated popular science images, focusing on their understanding, acceptance, and ethical implications. By examining their cognitive and moral development, the study aims to guide the responsible use of generative AI tools in popular science creation, ensuring content is both ethically appropriate and educationally effective for this group.

Methodology and tools

Questionnaire survey

Experimental approach

Research Process

1 *Research Design*
A mixed-method approach was adopted, combining quantitative surveys and experiments to obtain numerical data.

2 *Experiment*
Ten images, 50% human-generated and 50% AI-generated, are shown to adolescents. These images cover five themes: animals, plants, life sciences, astronomy, and mechanical engineering. In the experiment, adolescents are informed the images come from both sources but not the ratio. While viewing, they score each image on a scale from -3 (AI-generated) to 3 (human-generated).

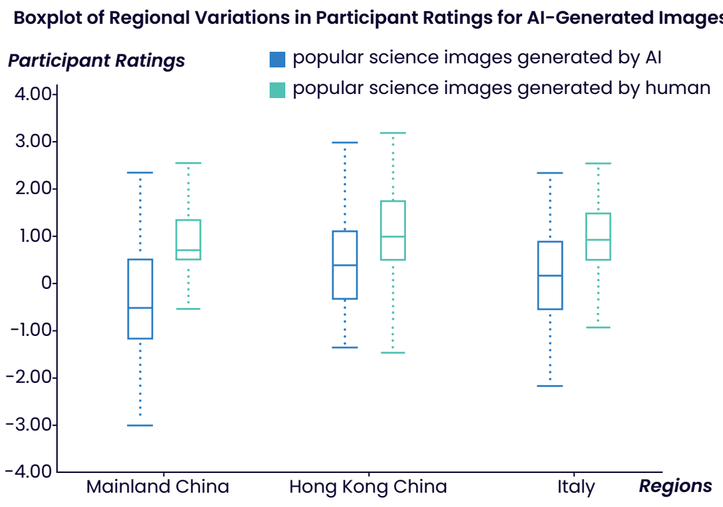
3 *Questionnaire*
It has two parts, covering demographics and the acceptance of AIGC, which divided into three dimensions: Cognitive components, Affective components, and Behavioral components(Suh & Ahn, 2022).

4 *Data Collection*
Surveys were sent online and offline. 142 questionnaires were distributed in Italy, Hong Kong (China) and Mainland China. After removing 1 invalid, 141 were valid.

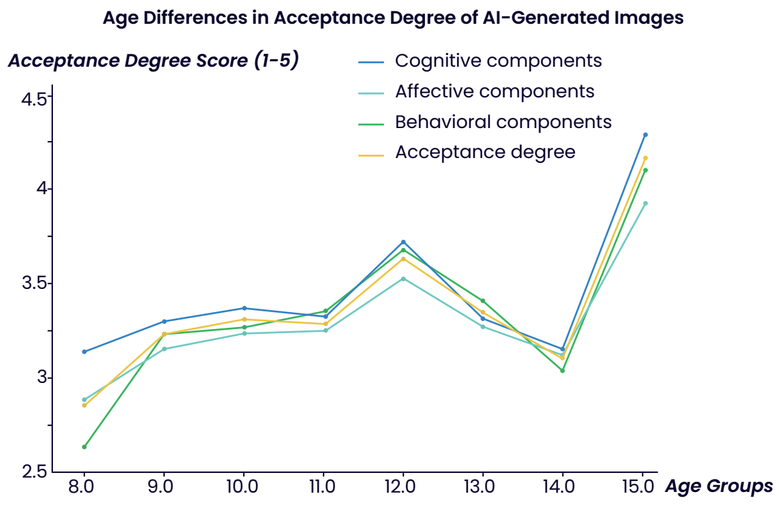
5 *Data Analysis*
Analyzed data with SPSS. Calculated Cronbach's α (0.963) and KMO (0.877) to ensure data reliability and validity.

AI-Generated vs. Human-Generated Popular Science Images: Materials for Adolescent Acceptance Study
Images were presented to adolescent participants in random order to mitigate the potential impact of presentation sequence on rating results.

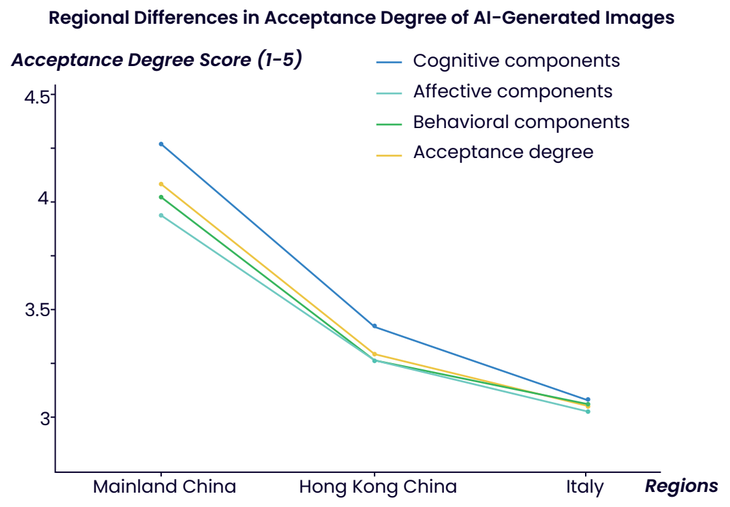
Results



In general, teenagers tend to evaluate images as generated by humans. Teenagers in Hong Kong have a wider range of scores, but they still tend to think it is made by humans.



There is no difference in the acceptance of different gender samples, but there are significant differences among different age samples.



Teenagers in mainland China are more receptive and inclusive to AI, followed by Hong Kong and finally Italy.

Conclusions

By aligning with frameworks such as the EU's Ethics Guidelines for Trustworthy AI and UNESCO's recommendations, this study underscores the importance of integrating ethical considerations into the design, dissemination, and evaluation of AI-generated content for adolescents.

(1)Fairness and Respect for Regional Characteristics:
Adolescents' understanding of AIGC exhibits significant regional variations. These differences must be respected in the design and dissemination of AI-generated popular science images to ensure cultural inclusivity and avoid bias.

(2)Transparency and Age-Appropriate Design:
When formulating AI-driven design strategies, the cognitive development levels of different age groups must be carefully considered. Transparent communication about the use of AI in creating such materials is essential to foster trust and understanding among adolescents.

(3)Accountability through Media Literacy Education:
Strengthening media literacy education is critical to empower adolescents to identify AI-generated content and discern potential misinformation. This education should not only equip them with practical skills but also instill a sense of responsibility in consuming and interpreting digital content.

(4)Protection of Rights and Interests:
The application of SATAI provides valuable insights into adolescents' attitudes toward AI-generated popular science images. These findings can inform the development of robust evaluation systems for AI educational materials, ensuring that the rights and best interests of adolescents are safeguarded in accordance with ethical AI principles.

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DESIGNING WITH BIAS: HOW AI REINFORCES IDEOLOGIES IN PRODUCT CREATION

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ABSTRACT | This paper investigates how Artificial Intelligence (AI) tools in product design perpetuate socio-cultural ideological biases through algorithmic processes and historical data reliance. By employing a mixed-methods approach—including AI-generated design artifacts via Midjourney and semiotic analysis—the study reveals how AI-driven designs reinforce stereotypes related to gender, identity, and societal roles. The research demonstrates that AI models, trained on biased datasets, prioritize and amplify existing norms, leading to design outputs that reflect and propagate dominant ideologies. The proposed *Framework of Ideological Reinforcement* delineates a five-stage cycle: data input, algorithmic processing, filter mechanism, user interaction, and self-replication. A case study of AI-generated office chairs for lawyers exemplifies how designs reinforce traditional gender roles and authority structures through material and aesthetic choices. The findings highlight AI's dual role as a mirror and agent of societal values, normalizing biases through material and functional choices. While existing strategies like dataset diversification and fairness-aware algorithms offer partial solutions, the study underscores the urgency of ethical oversight, critical designer awareness, and inclusive practices to disrupt ideological cycles in AI-driven design.

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KEYWORDS | AI-GENERATED DESIGN, IDEOLOGICAL REINFORCEMENT, ALGORITHMIC BIAS, SEMIOTIC ANALYSIS

1. Introduction

In recent years, the integration of Artificial Intelligence (AI) tools into product design has revolutionized creative processes, enabling designers to rapidly generate concepts and prototypes. However, this growing reliance on AI also introduces a critical issue: the inherent biases embedded in AI algorithms(Zhang et al., 2023). These biases, often reflective of societal stereotypes, can significantly influence the design outcomes, subtly reinforcing ideologies and perpetuating existing power dynamics(Atzei, 2024). While most research has focused on the ideological biases reflected in AI-generated images, texts, and interactive interfaces, there remains a discernible gap concerning how these biases manifest within AI- generated product designs.

This paper seeks to fill this gap by critically examining how AI-generated product designs serve as vehicles for ideologies, reinforcing stereotypes and perpetuating ideological biases related to gender, identity, and socio-cultural roles. Specifically, this study explores how AI-driven product designs—by virtue of their algorithmic processes—may unintentionally amplify stereotypes and contribute to the broader dissemination of ideological messages embedded in design objects. Through a mixed-methods approach—including the generation of design artifacts via Midjourney, along with content analysis rooted in semiotics—this study aims to uncover the embedded ideological biases within AI-generated product design and explore how these biases exacerbate the ideological control inherent in contemporary design practices.

This study sheds light on how these biases affect the design field, particularly in terms of the products that reach consumers, and the potential long-term consequences for both designers and users. It emphasizes the need for awareness and corrective measures in AI-driven design to ensure that future design practices are more inclusive and mindful of their ideological implications.

2. Theoretical Framework

2.1. AI-Generated Design and Ideological Bias

Algorithmic bias in AI-generated design stems from the human-curated nature of training data and the predictive logic of machine learning models. Rather than correcting historical and cultural biases, these systems tend to reinforce them by reproducing dominant design norms embedded in the datasets they are trained on(Atzei, 2024). Unlike human designers, who may critically evaluate socio-cultural biases, AI models operate through statistical pattern recognition, prioritizing design elements that align with historical data rather than fostering alternative perspectives. AI-generated design functions as a mechanism of ideological reinforcement by embedding cultural norms into consumer goods through algorithmic

optimization.

Prior research indicates that AI's reliance on biased training data has resulted in systematic reproduction of social inequalities across multiple domains, such as employment, financial services, public safety, and consumer-facing applications—where algorithmic outputs often exclude or misrepresent marginalized user groups(Kordzadeh & Ghasemaghaei, 2022). Research shows that AI-generated designs often replicate western aesthetic norms and gender stereotypes, reinforcing existing power structures. This stems from biased training data and the opaque nature of AI systems, where stereotypes are absorbed and reproduced without clear accountability (Doh & Karagianni, 2024; Thiebes et al., 2020). Designers, acting as cultural mediators, may unconsciously perpetuate these biases through familiar visual codes embedded in media culture(Roxburgh & Caratti, 2018).

Furthermore, algorithmic bias extends beyond individual designs to broader ideological constructs, subtly embedding dominant social narratives into material culture. As AI-generated designs become more prevalent, these biases are not only preserved but recursively amplified through a process of self-reinforcement.

2.2.Product as a Carrier of Ideology

Products operate as semiotic constructs that communicate ideology by encoding socio-cultural values through their form, function, and sensory attributes. Saussure's dyadic model frames each product as a sign composed of a signifier—its perceptible features—and a signified—the meanings constructed through cultural systems of difference (Chandler, 2022). These meanings are not fixed, but shaped relationally within a broader system of signs. Peirce's triadic model expands this framework by introducing the representamen (the form), the object (what is referred to), and the interpretant (the user's interpretation), highlighting how meaning is actively made by users through situated interpretation (Chandler, 2022). In product design, this interpretative process enables products to materialize ideology, subtly embedding cultural narratives into physical objects.

Extending this semiotic foundation, product semantics and cognitive linguistics emphasize that users derive meaning through conceptual metaphors, whereby unfamiliar product experiences are understood through familiar domains. According to Lakoff and Johnson (2003), metaphors shape not only language but perception and cognition, mapping abstract or novel concepts onto known experiential structures. Building on this, Du, Siu, and Shih (2024), propose that designers intentionally construct meaning by aligning *target domains* (product categories) with *source domains* (metaphoric references), enabling new concepts to emerge through *mapping* of shared attributes. For instance, a sports car's aggressive form and angular features metaphorically convey "speed" and "power," reinforcing masculine-coded ideals. As such, metaphor and semiotics converge to show how products both reflect and reinforce ideological norms through symbolic structure and experiential cues.

From a critical theory perspective, particularly the Frankfurt School, consumer products serve as cultural reproduction tools, embedding ideological norms under the guise of functional necessity(Horkheimer & Adorno, 2016). Marcuse (2013) critiques the assumption that technology is neutral, arguing that it often reinforces existing power structures. Product design, shaped by market logic, prioritizes commercial viability over ideological disruption, perpetuating dominant socio-economic structures.

Objectification theory offers a lens to understand how design reinforces social hierarchies by

treating users not as autonomous individuals but as instruments fulfilling predefined social functions (Nussbaum, 2000). Product design decisions often encode normative assumptions about gender, class, and identity—for instance, products marketed toward women may emphasize elegance, delicacy, and domesticity, while those targeting men frequently stress strength, control, and technical authority. These aesthetic codes embed ideological expectations into material form, illustrating how design functions as a medium of objectification and an agent of social norm reinforcement.

By synthesizing semiotics, critical theory, and objectification theory, it becomes evident that product is an active agent in the transmission and reinforcement of socio-cultural ideologies, embedding dominant power structures within material culture.

2.3.AI-Generated Product Design as Ideological Reinforcement

Compared to AI-generated graphic design, where biases may be more visually apparent, biases in AI-generated product design are more insidious—embedded not in images, but in material choices, affordances, and usability logics. This makes their ideological influence more difficult to detect, yet more pervasive in shaping user interactions and reinforcing social expectations.

This process can be understood through the concept of semiotic pollution (Manzini & Cullars, 1992), which describes how the overproduction of signs and forms leads to desensitization and diminished critical interpretation. AI-generated product design operates in similar fashion: repeated design iterations shaped by biased training data normalize particular aesthetic and functional conventions. Over time, this saturation conceals the socio-cultural assumptions embedded in design, reinforcing dominant norms while rendering alternative possibilities obscure or illegible.

Unlike static visual outputs, AI-generated products exist as physical realities—actively shaping how people move, touch, sit, grasp, and navigate. Drawing on Merleau-Ponty’s (1964) phenomenology of perception, product interaction is not abstract but embodied; consciousness is formed through action—what he terms an “I can” rather than an “I think”. When AI-generated designs prioritize a normative user—often aligned with male, Western, or dominant body types—they materialize exclusion through usability constraints, reinforcing invisible hierarchies through interaction.

AI’s reliance on historical data compounds this issue. Rather than challenging inherited design biases, machine learning models amplify them through recursive optimization—a process akin to what Flusser (2000) describes as self-replicating ideology. For example, ergonomic datasets that center male proportions or stylistic precedents rooted in Western minimalism shape future outputs that marginalize other users and aesthetics. In this loop, AI does not merely reflect ideology—it actively participates in its reinforcement.

AI-generated product design embeds biases in subtle yet pervasive ways, shaping user interactions and societal norms through material and functional choices. These biases—sustained by semiotic pollution and recursive ideological reinforcement—not only normalize dominant narratives but systematically obscure alternative perspectives. Addressing this requires more than technical correction; it demands a critical rethinking of design’s role in the reproduction of social hierarchies and a commitment to more reflexive, pluralistic design futures.

2.4. Summary

This section has demonstrated that AI-generated product design is not a neutral or value-free process, but one that systematically reproduces existing ideological biases. Through algorithmic optimization, AI embeds socio-cultural norms into product aesthetics, functionalities, and usability logics. Semiotic analysis reveals how these outputs materialize power hierarchies and gendered expectations, reinforcing dominant social structures. This ideological reinforcement operates recursively, as market validation privileges historically established conventions over alternative or subversive possibilities. Together, these findings lay the theoretical foundation for articulating an ideological reinforcement framework within AI-driven product design.

3. The Ideological Reinforcement Framework of AI-Generated Product Design

As AI becomes increasingly integrated into the product design process, its generative capabilities play a significant role in perpetuating and reinforcing ideological biases. To unpack this phenomenon, the following analysis explores the structured process through which AI-generated product designs sustain and propagate socio-cultural norms, embedding them into material culture. By outlining the Framework of Ideological Reinforcement, we aim to illuminate the mechanisms by which AI contributes to design homogeneity and reinforces dominant power structures, offering a foundation for critical examination and intervention.

3.1. Framework of Ideological Reinforcement

The ideological reinforcement of AI-generated product design operates through a structured mechanism in which AI systems encode, reproduce, and solidify socio-cultural norms through iterative design processes. This mechanism comprises five interrelated stages—Data Input, Algorithmic Processing & Ideological Encoding, Filter Mechanism, User Interaction & Behavioral Reinforcement, and Self-Replicating & Reinforcement—forming a closed-loop cycle that perpetuates dominant ideologies in AI-generated products. Figure1 visualizes the closed-loop cycle of ideological reinforcement, and the following paragraph provide a detailed analysis of each stage, examining how they collectively contribute to the ideological reinforcement of AI-generated product design.

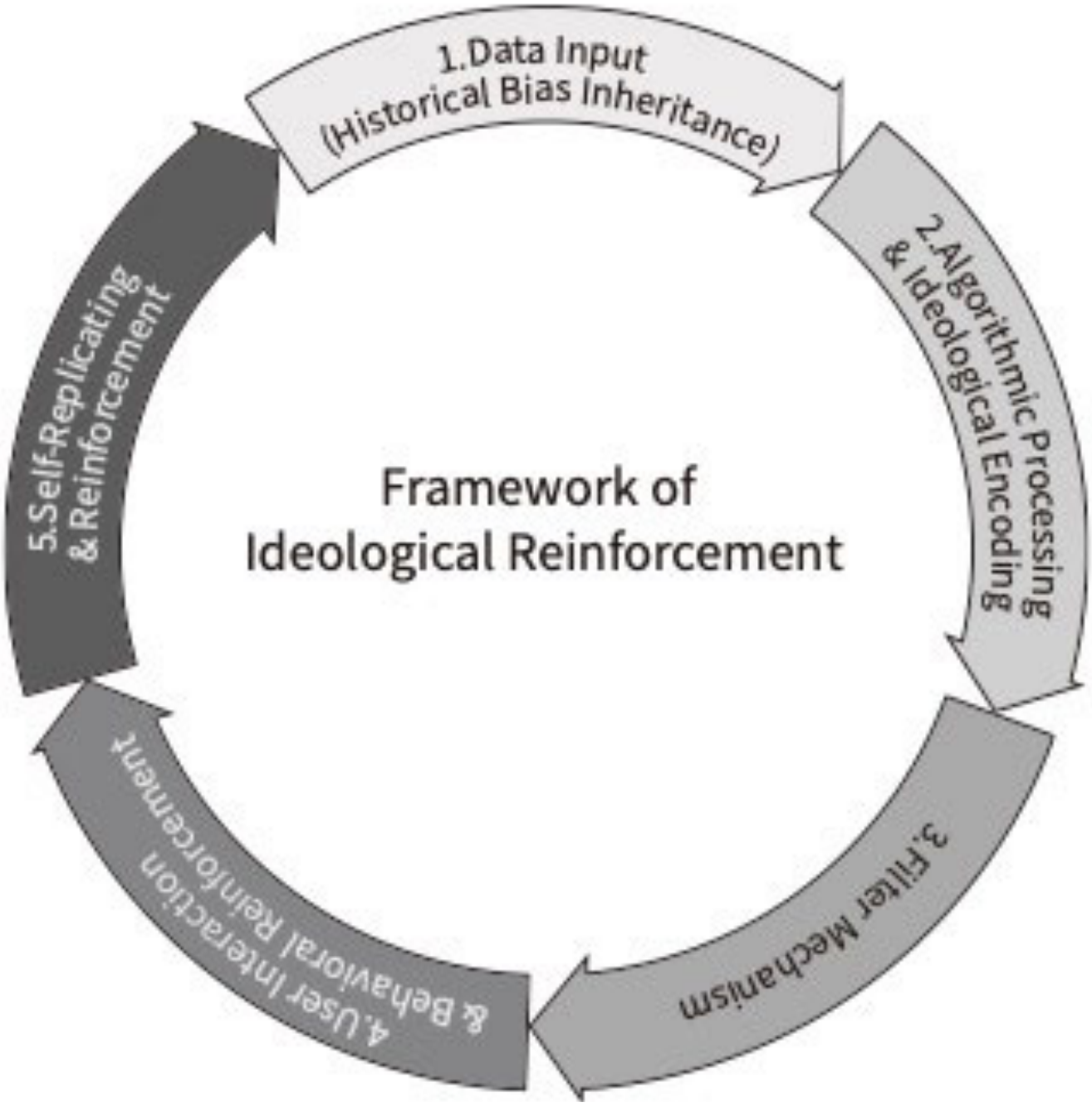

Figure 1. Framework of Ideological Reinforcement delineates a five-stage cycle: data input, algorithmic processing, filter mechanism, user interaction, and self-replication.

Stage 1-Data Input (Historical Bias Inheritance): AI design models are trained on historical datasets that inherently reflect market trends, user behaviors, and pre-existing socio-cultural biases. These biases, embedded in previous design conventions, establish a foundation where AI perpetuates dominant gender roles, Western-centric aesthetics, and class-based usability assumptions.

Stage 2-Algorithmic Processing & Ideological Encoding: AI applies pattern recognition and probabilistic optimization to generate product designs aligned with prior commercial successes. In this stage, design elements that conform to established norms are favored over alternative representations. For instance, ergonomic furniture is often based on anthropometric data primarily derived from male users, systematically excluding other demographic groups from optimal usability. Additionally, AI-generated products reinforce

conceptual metaphors in design, embedding existing socio-cultural meanings within material objects.

Stage 3-Filter Mechanism: AI-generated product designs enter a selection phase, where their commercial viability is assessed based on consumer preferences, corporate strategies, and regulatory influences. Products that align with mainstream user expectations are more likely to be produced and marketed, while those that challenge prevailing norms are filtered out. This selective reinforcement further entrenches ideologically encoded designs, limiting diversity in consumer product offerings.

Stage 4-User Interaction & Behavioral Reinforcement: Once AI-generated products enter the market, they actively shape user interactions and social behaviors. Consumers subconsciously internalize the ideologies embedded in these designs, further normalizing social roles and expectations. Gendered product aesthetics, for example, shape perceptions of who should use certain products, reinforcing long-standing cultural stereotypes.

Stage 5-Self-Replicating & Reinforcement: AI-generated product designs enter a continuous feedback cycle, where consumer engagement data is reabsorbed into training datasets. This process reinforces dominant aesthetic and functional norms, as AI models prioritize historically successful design patterns over novel or disruptive alternatives. The resulting self-replicating loop strengthens ideological continuity, making it increasingly difficult for alternative representations to emerge and perpetuating design homogeneity over time.

This structured framework demonstrates that AI-generated product design functions not merely as a technological tool but as an active mechanism for ideological standardization. By dictating aesthetic and functional standards, AI models extend their influence beyond the material realm, shaping behavioral norms, social hierarchies, and economic systems.

3.2. Ideological Encoding in AI-Generated Product Design

To empirically examine how AI-generated product designs encode and perpetuate ideological biases, a case study was conducted analyzing the outputs of a generative AI model (Mid-Journey) through the lens of Peirce's triadic model of semiotics. By focusing on a specific prompt—"an office chair for lawyer"—the study aims to uncover how AI interprets and materializes socio-cultural norms associated with professional identity and authority. This analysis not only demonstrates the practical application of semiotic theory in design research but also highlights the subtle ways in which AI reinforces dominant ideologies.

The case study involves two main steps. First, Mid-Journey was used to generate a series of office chair designs based on the prompt "an office chair for a lawyer." These outputs serve as the primary data for analysis. Second, Peirce's triadic model of signs was applied to deconstruct the AI-generated designs. As previously discussed, Peirce's model examines the relationship between the Representamen (the form that the sign takes), the Object (what the sign refers to), and the Interpretant (the effect produced by the sign or the sense made of it). This framework allows for a systematic analysis of how AI-generated product designs encode ideological meanings and how these meanings are likely to be interpreted by users.

Figure 2 displays the AI-generated office chair designs based on the prompt "an office chair for lawyer." The four designs exhibit striking similarities in form, material, style, and overall aesthetic.

Figure 2. Mid-journey generated images of “an office chair for lawyer”.

Figure 3. presents the semiotic analysis of these designs using Peirce’s triadic model. The Object, "an office chair of lawyer," serves as the foundation for the generated designs. The Representamen includes high backrest and wide seat, dark leather upholstery, tufted design, and soild wooden base. Each feature symbolizes elements traditionally linked with masculinity, luxury, and hierarchical power, conveying exclusivity and dominance. The Interpretant reinforces cultural perceptions of dominance and traditionalism, aligning with societal narratives of the legal profession as hierarchical and male-dominated. This analysis highlights how AI-generated designs embed and normalize existing ideologies through material and aesthetic choices.

AI-Generated Product Design using prompt “an office chair of lawyer”
-by Mid-journey

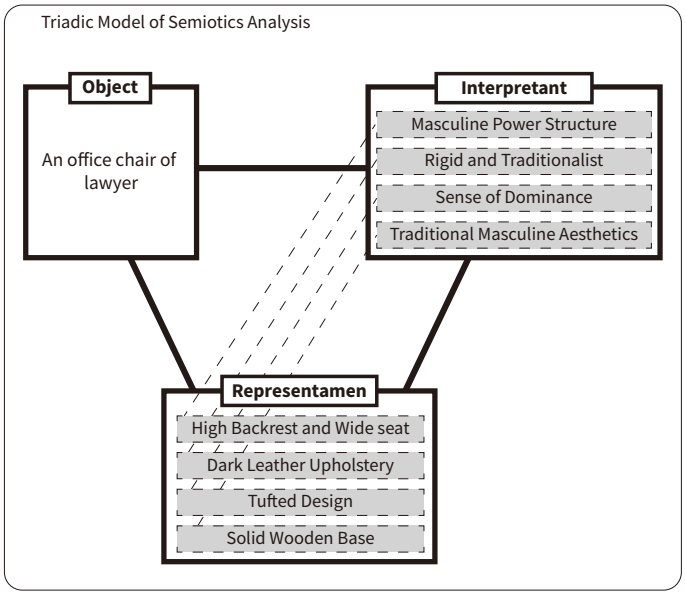

Figure 3. Analyzing AI-generated product design through Triadic Model of Semiotics.

The analysis of AI-generated office chair designs demonstrates how seemingly neutral generative processes perpetuate and amplify socio-cultural biases through material and aesthetic elements. By embedding traditional notions of masculinity, power, and exclusivity into the design, AI models reinforce existing hierarchical structures and cultural stereotypes. This case study highlights the subtle yet pervasive ways in which AI-generated product designs contribute to the normalization of dominant ideologies, underscoring the need for critical engagement with AI-driven tools in design processes. These findings further validate the proposed framework of ideological reinforcement, bridging theoretical insights with empirical evidence.

3.3 Integrated Findings

This section synthesizes insights from the proposed framework and the case study, demonstrating how AI-generated product designs encode, propagate, and normalize socio-cultural ideologies. The framework outlined in Section 3.1 offers a structured understanding of how historical biases embedded in datasets are translated into material designs through algorithmic processes. The case study in Section 3.2 complements this theoretical framework by providing tangible evidence of these dynamics in real-world outputs.

Together, the framework and case study reveal a self-replicating cycle of ideological reinforcement. Historical data repositories act as reservoirs of socio-cultural norms, shaping algorithmic outputs that prioritize conventional aesthetics and usability standards. These outputs then influence user perceptions and behaviors, further entrenching existing ideologies into material culture. The iterative process highlights the dual role of AI: as a mirror of societal values and as an agent actively perpetuating them.

These findings underscore the necessity of diversifying training datasets, embedding ethical oversight in AI development, and fostering critical awareness among designers and users. By addressing these challenges, the design community can work to disrupt cycles of ideological reinforcement, advancing more inclusive and equitable design practices.

4. Existing strategies

Existing strategies to mitigate ideological biases in AI-generated design include preprocessing, algorithmic training, and post-processing adjustments. Techniques such as reweighing, optimized pre-processing, and disparate impact remove address bias in datasets(Bellamy et al., 2018) (Friedler et al., 2019), while methods like adversarial debiasing and fairness-aware regularization aim to reduce bias during model training (Friedler et al., 2019). Post-processing approaches, including equalized odds post-processing and reject option classification, further refine outputs to enhance fairness(Bellamy et al., 2018). Additionally, counter-stereotypical design strategies(Gill & Lei, 2018) and reflective design practices(Turner & Turner, 2011)—such as gender-neutral aesthetics and inclusive user participation—offer ways to challenge entrenched norms in product design.

However, these solutions often rely on designers' critical thinking, judgment, and experience to identify and counteract problematic outputs. While effective in professional settings, these strategies fail to address the widespread, unchecked adoption of artificial intelligence by individuals with limited design expertise, such as students, hobbyists, and early-career professionals. These users frequently misuse artificial intelligence, uncritically accepting AI-generated content due to a lack of critical thinking skills, design experience, and judgment.

5. Discussion

This study highlights the pervasive role of AI-generated product design in encoding and perpetuating socio-cultural ideologies. The proposed framework and case study reveal a self-reinforcing cycle where historical biases in datasets shape algorithmic outputs, which in turn influence user perceptions and behaviors.

The limitations of existing strategies, particularly their reliance on professional expertise, point to the urgent need for accessible guidelines and educational resources to promote responsible AI use, fostering critical engagement with AI outputs across diverse user groups.

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DISCIPLINE-AND-CONTROL SOCIAL MEDIA: EXAMINING POWER, FREEDOM, AND PRIVACY ON FACEBOOK, AND THE ETHICAL IMPLICATIONS FOR INTERNET GOVERNANCE AND USER EXPERIENCE DESIGN.

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ABSTRACT | Background: The proliferation and penetration of social media into professional and everyday lives have reshaped the way in which people engage with multiple stakeholders and deal with their personal information, and called for user experience designers to develop refreshed understanding of the power relationship between individual users and technology giants in the design of social networking sites. While Facebook has rapidly ascended to the peak of social media popularity, the ease of connection to a common space also poses the threat of intrusions into personal space, which is even greater now that Meta is heavily investing in artificial intelligence, virtual reality, extended reality, and digital currencies in the Metaverse. Privacy might be on the verge of death as new media constantly erode private spaces and blur the boundary between the private and the public. **Research gap:** The widespread acceptance of Facebook in social and professional communications has bestowed on the network a

unique and highly influential form of power: the power to control users' privacy and construct new online privacy norms. If the use of Facebook is a realisation of the "technologies of power," then the process of surveillance and normalisation by which Facebook users are made objects of control may actualise Foucault's well-known panopticon metaphor. However, despite intensified privacy concerns and crises over social media, there is little research on the correlations between users' privacy perception and protection in non-Western settings. **Research aim:** Focusing on Hong Kong Chinese Facebook users, this study examines the extent to which they are willing to sacrifice control over their information in exchange for self-expression, sociality, and intimacy in their social roles and relationships. **Theoretical contribution:** Informed by literature on privacy paradox and Foucault and Deleuze's work on power, we developed the notion of "discipline-and-control social media" to describe the situation in which the power relationship is co-shaped and negotiated among the platform, governing bodies, user experience designers, and users, in a combination of both discipline and control. **Methodology:** Data from a survey of 797 Hong Kong users were used for our analysis of privacy perception and protection. The survey contained three sections: Facebook usage, attitudes and behaviours, and demographics. **Results:** The findings reveal that the privacy paradox is evident for Facebook users in Hong Kong, and that excessive Facebook use leads to reactive privacy awareness and normalisation behaviours. **Ethical implications:** We suggest that technology giants should be pioneers in safeguarding users' privacy while encouraging the establishment of social relationships and freedom of expression in digital ecosystems. The implications for Internet governance as well as user experience design, in terms of balancing between usability and accessibility on the one hand and privacy and risk on the other, are discussed from a multistakeholder perspective.

KEYWORDS | DISCIPLINE-AND-CONTROL SOCIAL MEDIA, FACEBOOK, POWER, FREEDOM, PRIVACY PARADOX, INTERNET GOVERNANCE, USER EXPERIENCE DESIGN

1. Introduction

The proliferation and penetration of social media such as Facebook into professional and everyday lives have reshaped the way in which people engage with multiple stakeholders and deal with their personal information, and called for user experience (UX) designers to develop refreshed understanding of the power relationship between individual users and technology giants in the design of social networking services (SNSs). While statistics indicate that Facebook, the world's most popular SNS in 2025, is present in every major global market and in many cases with remarkable levels of penetration (Statista, 2025), the ease of connection to a common space also poses the threat of intrusions into personal space, which is even greater now that Facebook has rebranded itself as Meta and is heavily investing in artificial intelligence, virtual reality, extended reality, and digital

currencies in the Metaverse.

Under such circumstances, user privacy has become a key point of contention, and might be on the verge of death as social media and search engines constantly erode private spaces and blur the boundary between the private and the public. As it stands, the Facebook privacy debate sits between two extremes: at one end is the argument that society is, in general, loosening its standards regarding privacy, which makes privacy a luxury commodity in the social media age (e.g., Papacharissi, 2010, 2023), and at the opposite end is the argument that it is essential for personal privacy to be maintained and improved (e.g., Cadwalladr & Graham-Harrison, 2018).

While most of the research on user privacy in the social media age has been conducted in Western contexts in relation to topics such as media use and user behaviours (e.g., Khan, et al, 2023; Xu & Jia, 2015) and privacy awareness from a legal perspective (e.g., Hanlon & Jones, 2023; Martin, 2016), Chen and Cheung (2019) demonstrate that privacy concerns have been on the rise in Eastern contexts, despite privacy being understood differently in Eastern cultures. Using Facebook as a case study, this study focuses on the privacy perception and protection of Hong Kong Chinese users, with the aim of contributing to filling the research gap opened by the tendency of Facebook research to focus on Western users, despite its primary users being outside the US (Singh & Bagchi, 2020).

As pointed out by Cheung (2016), Facebook tries to naturalise and advance the notion and acceptance of social transparency as its wealth is sustained through the commodification of personal information generated by its users, which is sold on to advertising companies to assist in targeted advertising campaigns supported by recommendation algorithms and engines. It is thus in Facebook's best interests to encourage people to continue sharing more personal information and, at the same time, to downplay any concerns raised by privacy advocates. Meanwhile, although it seems logical to say it is not in users' best interests to place their personal information at risk of exposure, users continue to flock to Facebook while doing little to protect their personal privacy. It appears that during the time it has taken for users to reach a point of disillusionment with Facebook, they have simultaneously been heavily investing in and accumulating social capital through the SNS, the perceived value of which appears to outweigh that of personal privacy. Yet privacy concerns still prevail at different levels.

At a personal level, Facebook users have newly formed and often algorithm-based social norms and conventions as well as popularity-based algorithmic feeds imposed upon them online. They are also the target of information attacks, and face political, commercial, and organisational surveillance and intrusion that are directly connected

with user privacy (Chen & Cheung, 2019). Facebook features, such as *Feed* and *Share*, have also triggered specific privacy concerns. Users can publish their personal information on the SNS and have connected parties automatically notified through the site's *Feed* function, even though personal information unintended for disclosure may be retrieved by unwanted third parties. This is evident in the scandal involving Cambridge Analytica, with Facebook accused of meddling with the 2016 US presidential election by granting access to users' data to third parties (O'Sullivan, 2018). Users are also forced to grandstand to an ever-greater extent when uploaded materials are "liked" or "reacted to" by other users. In addition to Facebook's overlords and the advertisers who are their clients, each user's own social network of friends, family members, colleagues, and acquaintances may also present a heteronomous power over what users post (Trepte, 2021).

At an organisational level, such digital labour not only sustains the "free in exchange of advertising" business model but also generates valuable big data stacks awaiting further exploitation for algorithm-prioritised engagement (Bairstow & Neofytos, 2024). On the other hand, privacy concerns not only challenge the very business model of social media but also pose policy, legal, and political concerns over Internet governance and UX design. Internet governance is defined by Solum (2008, p.50) as the "regulation of Internet infrastructure, its current operation, and the processes by which it develops and changes over time." The stakeholders include not only legislators, policymakers, and regulators, but also service providers, UX designers, and SNS users, among others.

Within the legal framework, privacy and cybersecurity laws, such as Hong Kong's Personal Data (Privacy) Ordinance and the European Union's General Data Protection Regulation, have been enacted to tackle the issue of privacy and to improve Internet governance. However, some unregulated corporate platform strategies, algorithms, and affordances present challenges for users' online privacy literacy (Bartsch & Dienlin, 2016). According to some studies, users expressed anxiety and regret over publishing their activities online (e.g., Guha, et al, 2018; Moore & McElroy, 2012). The rise of social media poses even more severe threats to the lay users who frequently publish highly personal information onto Facebook.

However, it is unreasonable to simply make use of hindsight to criticise Facebook users' relatively blind confidence in the purity or goodwill of the social network. Their perception of social media is in line with the early utopian notion of an open internet, which has been strengthened by the celebration of participatory culture (Jenkins, 1992) and empowered by the marketing and public relations rhetoric deployed by commercialised social media and relevant interest groups (Chen & Cheung, 2019; Cheung, 2016). The initial sense of grand optimism about the power that Facebook gave users to connect is problematic,

especially when the “networked self” has become entangled with the public sphere and when the boundary between the public and the private is increasingly blurred. Against this backdrop, this study explores the power dynamic between Facebook and its users. It addresses the following research question:

> **RQ.** Although Hong Kong Chinese Facebook users are expected to adhere to the social and organisational codes, regulations, and norms of social media use, to what extent are they willing to sacrifice control over their information in return for the ability to express themselves, and to interact freely and maintain connection and intimacy in their social roles and relationships?

This article first situates the research by reviewing the literature relating to Facebook privacy and using Foucault and Deleuze’s conceptualisations of power in society to frame relevant hypotheses. It then turns to the research methodology and introduces a questionnaire survey conducted among 797 participants, the results of which are followed by a discussion of their ethical implications for Internet governance and UX design.

2. Literature review

2.1. Power, freedom, and privacy

To provide an understanding of the power dynamic between Facebook and its users, this article draws on the work of Michel Foucault and Gilles Deleuze. According to Buchanan (2015), the origin of Deleuze and Guattari’s work is a central concern with power, with a particularly close link to the Foucauldian conceptualisation of power and governmentality. Foucault (1980, p.93) states,

> "Power is not an institution, and not a structure; neither is it a certain strength we are endowed with; it is the name that one attributes to a complex strategical situation in a particular society."

Power, for Foucault, is omnipresent and manifests itself through discursive interactions (e.g., power and knowledge creation). Since the translation of Foucault’s *Discipline and Punishment* in 2009, there has been a refashioned sociological interest in revisiting Foucault’s ideas on governmentality or the technologies of the self (Gane, 2012). As we show in this article, the “individualization of the self” thesis is actualised by the “technologies of the self” (Foucault, 1988), where self-formation and normalisation (according to certain norms—in this case, the normalisation of self-exposure through social media) are practised through the self as an enterprise, intertwined with disciplinary

states, and penetrative market forces. This reflects the central focus of Foucault's account of liberalism and neoliberalism, in which he argues that in the neoliberal market economy, power "conducts the conduct" through economised self-management and disciplinary control. On this line of thought, freedom or autonomy is practised at a minimal level that is captured and disguised by neoliberalism.

In the online environment of Facebook, users appear to possess many freedoms. However, when it comes to individual privacy, Facebook users have, or at least behave in such a way that would suggest they have, a declined sense of their own freedom and rights to privacy. The widespread acceptance of Facebook, as an integral part of modern social and professional communications, has bestowed on the network a unique and highly influential form of power: the power to control users' privacy and construct new online privacy norms. If the use of Facebook is a realisation of the "technologies of power," then the process of surveillance and normalisation by which Facebook users are made objects of control may, to a certain extent, actualise Foucault's well-known panopticon metaphor, which refers to Jeremy Bentham's 1785 architectural design for prisons. Foucault (2000, p.70) states,

> "Panopticism is a type of power that is applied to individuals in the form of continuous individual supervision, in the form of control, punishment and compensation, and in the form of correction, that is, the molding and transformation of individuals in terms of certain norms."

From this idea, we can grasp that Facebook actualises power over its most highly ritualised users (those who are frequent users of the platform and have become familiar with its functions and vernacular culture over time) as reflected by its discipline in shaping their behaviours. In addition, there is a level of control reflected by its normalisation of privacy transparency for its less ritualised and prospective users. In this connection, Deleuze (1992) argues that as technology advances, there is a gradual move from the Foucauldian disciplinary society to a "control society." Unlike the disciplinary society, the control society as described by Savat (2009, p.54) is "solely interested in predicting rather than producing specific forms of behaviour, and in part because, depending on the code that is generated, a given pattern is allowed or enabled to continue or not."

Based on this assessment, we developed the notion of "discipline-and-control social media" to describe the situation in which the power relationship is co-shaped and negotiated among the SNS platform, governing bodies, UX designers, and its users, in a combination of both discipline and control. Currently, Facebook users sacrifice to a certain extent the privacy of their personal information in return for the freedom to

express themselves and to interact with friends and acquaintances. Despite the seemingly clear decision from many users to comply with this arrangement (forming a kind of social contract at a platform level), it is logical to assume that this will not be mirrored in the thoughts and desires of Facebook users in the future. As users' unwillingness to accept diminished freedom shines through, the dominant position that Facebook enjoys in this power relationship will continually face challenges and resistance.

2.2. Discipline-and-control social media

As is the nature of technology, Facebook has spent its relatively short life in a constant state of evolution. However, one aspect of its development that has remained consistently at the forefront of criticisms is the way in which Facebook manages its users' privacy on the site. Facebook has, to its credit, been somewhat proactive in response to public criticism, making changes and additions to the functionality of its user-controlled privacy settings. However, these changes have seldom been met with praise from privacy advocates. A key example of an occasion that resulted in a negative backlash and criticism of Facebook came in December 2009, when Facebook initiated a major shift in how their users' privacy was controlled; this involved altering the default privacy settings of users from their old settings to instead making their information visible to "everyone" (Kirkpatrick, 2009). When questioned about the privacy changes, Facebook CEO Mark Zuckerberg stated,

> "People have really gotten comfortable not only sharing more information and different kinds, but more openly and with more people. That social norm is just something that has evolved over time." (Johnson, 2010)

Interestingly, Zuckerberg's use of the term "social norm" implies a direct belief that Internet users are evolving into more transparent creatures to be disciplined, controlled, and put under surveillance. It is a counter-discourse (against the ongoing Internet governance and legal discourses) with an aim to shape and normalise, in a Foucauldian sense, the sharing of private information. It forms part of the apparatus of the technologies of the self, with the aim to discipline and change users' beliefs and behaviours. At purely face value, this assertion is hard to rebut; by sheer power of numbers, it would appear that Facebook users are not just comfortable but even keen to live with increased transparency through social media. However, the assertion has failed to garner any support from research addressing the behaviours, opinions, and perceptions of Facebook users with regard to privacy. Studies (e.g., Masur & Trepte, 2021; Lilley, et al, 2012) indicate that Facebook users' complicity in increased levels of transparency is not driven by any internal shift in the beliefs that govern perceptions of

privacy norms among them; rather, the informed possibility of severe consequences that could arise through the misuse of personal information was a catalyst for increased privacy concerns.

Combining the knowledge of these studies debunks the manipulation of discourse by Facebook to claim that society is evolving to embrace transparency by way of ignoring individual privacy. This leads us to the conclusion that Facebook does, indeed, play a role in engineering new online privacy norms as support for the assertion that the new norms are socially driven is empirically ungrounded. Given the amount of coverage that Facebook privacy issues have received in the mass media over the past few years, it would be hard for users to not have become aware, to some degree, that they should harbour concerns about the privacy and protection of their personal information on Facebook. It would be logical to assume that the natural response to such concerns would be to seek a means to improve the security of their personal information. However, there is a privacy paradox in that users hold a high level of concern but, in reality, do little to further the protection of such information.

To try to understand the cause of this paradox, we can speculate that it comes down to a simple cost-benefit analysis by Facebook users. Studies indicate that loneliness, self-presentation, and audience response are positive predictors of Facebook use (Bareket-Bojmel, et al, 2016; Blachnio, et al, 2016). Once users have integrated part of their social engagement within the Facebook system, the incentive for them to remain a part of the system outweighs their need to secure their privacy online. In response, the incentive for Facebook to willingly improve the privacy of its users is not nearly as strong as it might otherwise be, as it understands the social investments its users have made will drive most of them to stay regardless of whether it delivers the improvements that they call for. This is without mentioning the fact that Facebook's wealth is sustained through the commodification of user-generated content (Cheung, 2016).

The social power that Facebook has now acquired drives more and more people to become involved and to stay involved in an effort to avoid social exclusion. This has translated to users' continued use of the SNS despite privacy concerns. It renders Facebook a powerful "discipline-and-control social media" in line with the Foucauldian *disciplinary society* and the Deleuzian *control society*. In this context, *discipline* refers to the "designated rules and regulations" that shape users' behaviours, and *control* signifies the "becoming codes and mechanisms" that anticipate normalising and ritualising the beliefs and behaviours of current and prospective users. Users are part of the power apparatus as they post, share, and carefully curate their own online identity with significant social and emotional investment. Such self-representation and performance both support and resist the "discipline-and-control social media" as users verbalise (post

and share) and confess to their everyday life goals and failures. To continue using social media in the anticipated (and resistant) manner is the only way for users to demonstrate their identity and existence.

2.3. Research hypotheses

Thus far, we have established the existence of an intriguing and somewhat concerning power dynamic at play between Facebook and its users. Users would not usually willingly sacrifice the freedom of control over their personal information, yet they do so because the alternative of leaving Facebook is the equivalent of self-imposed social exclusion. Despite heavy dialogue, Facebook and its users have been unable to reach a point of equilibrium on the matter (e.g., Glance, 2018). This study's first hypothesis is, therefore, the following:

> **H1.** Hong Kong Chinese Facebook users possess a concern for their privacy but their behaviours continue to indicate an acceptance of Facebook's imposed privacy norms. That is to say, the perceived fulfillments derived from using Facebook outweigh the importance of privacy protection.

Other studies have indicated that many people are displaying habitual Facebook usage patterns that suggest a wariness and concern for the possibility that their privacy may be exploited or that they are under some form of surveillance. These habits include removing tags from photos, editing the Facebook wall, unfriending people, adjusting self-disclosure strategies, and attempting to adjust privacy settings (e.g., Taneja, et al, 2014). This study's second hypothesis is thus as follows:

> **H2.** Hong Kong Chinese Facebook users are aware of the surveillance over their lives, and this awareness influences the online behaviours of frequent Facebook users and promotes the formation of behaviour normalisation on Facebook, in an evident case of "discipline-and-control social media." A panoptic effect is relevant here as the platform aims to "discipline" users' behaviours while also aiming to "control" a process within an anticipated and imposing "prison without walls."

3. Research methodology

The study was situated in the context of Hong Kong, where the majority of the population is Facebook users. Following the exploratory approach of Nassar-McMillan and Borders (2012), a survey instrument was developed and validated through the conduct of focus group interviews with a sample of active Facebook users in the city. The survey questionnaire derived consists of three sections:

- 15 multiple-choice questions related to Facebook usage;
- 49 items concerning respondents' attitudes and behaviours with regard to Facebook;
- Requests for information from the respondents about their basic demographics.

The survey was then distributed via an online platform to 1472 young adults randomly recruited from the email lists of the business, humanities, law, and sciences faculties of a Hong Kong university over a four-week period. They are all Hong Kong Chinese. At the survey's conclusion, a total of 797 responses had been received, yielding a response rate of 54.14%. The survey was voluntary, and respondents were entered into a cash prize draw.

The respondents started by providing basic information on their Facebook usage, and were asked about their motive for setting up their Facebook account. In addition, to investigate the role played by Facebook "friends," respondents were asked to indicate how many friends they had and what kind of friends they accepted. Moreover, respondents were asked to specify what types of personal information they had revealed in their Facebook profiles, such as basic descriptors, contact information, education and work information, personal likes and interests, and the names of family members. They also indicated the accuracy of each piece of profile information by selecting one of three options: 1. "I don't provide this information at all," 2. "I provide this information, but it is not complete or not accurate," and 3. "I provide this information, and it is complete and accurate." Furthermore, the survey asked them how often they updated their profile information. In addition, they were asked a number of questions about their privacy protection practices, including, how often they adjusted their Facebook privacy settings; their major reason for using fake names or photos in their profile; to whom they disclosed their profile such as photos/videos, and contact information, etc.

To evaluate the weight of perceived fulfillments relative to the importance of privacy protection (H1) and to investigate the relationship between awareness of surveillance and the ritualised use of Facebook (H2), 49 attitudinal items were included in the survey questionnaire: 32 items addressing H1 and 17 addressing H2. Respondents reported their answers on a 7-point Likert scale ranging from 1 for "strongly disagree" to 7 for "strongly

agree." Finally, such demographic variables as age range and education level were also recorded.

4. Results and discussion

Four of the survey respondents (n = 797) had no Facebook account and were thus excluded from the dataset. The remaining 793 were all current Facebook users, with 89.53% in the 18–25 age range and 8.70% aged 26–35. The majority of the sample was undergraduates (68.22%), followed by diploma/higher diploma/associate degree students (17.53%), and postgraduates (14.25%). Since the primary focus of this study is frequent Facebook users, respondents who indicated they logged into Facebook fewer than three times per week were defined as nonfrequent users, with the 79 who fell into this category eventually filtered out of the dataset. As a result, the data of 714 out of 797 respondents (89.59%) were deemed applicable for analysis.

In terms of Facebook usage patterns, 89.77% of the 714 respondents had set up their Facebook accounts more than a year previously and that 56.72% had three or more years of Facebook experience. Less than a quarter (16.67%) of respondents logged into their accounts just 3–5 times per week, with 19.47% logging in 6–9 times per week, and 63.87% logging in at least 10 times per week. Roughly a fifth (21.01%) reported spending 15 minutes or less, on average, during each visit to Facebook, whereas 37.25% said they spent 15–30 minutes, 20.73% said 30–60 minutes, and 21% said more than an hour.

In this survey, just 9.94% of respondents reported fewer than 100 Facebook friends, followed by 22.55% with 100–200 friends, 22.27% with 201–300 friends, 19.47% with 301–400 friends, 12.18% with 401–500 friends, and 13.59% with more than 500 friends. When asked about the role of friends on Facebook, 69.89% of the respondents said they accepted as friends only "people whom I know personally."

When asked about their profile information on Facebook, 52.80% of respondents indicated that they seldom update it, whereas 27.31% said they do so 1–2 times per week. The survey results also indicate that respondents were likely to disclose some of their personal information fully, such as their gender (85.43%), profile picture (71.57%), email address (71.01%), and date of birth (63.45%). In contrast, far fewer respondents said they share such information as their personal phone number, home address, employer's name, job title, sexual orientation, partner's name, family members' names, and religious views.

When asked about their privacy settings on Facebook, 61.48% of the respondents reported that they seldom adjust them, with 29.55% stating that they do so 1–2 times per month.

Furthermore, 40.76% of the respondents reported using fake names or photos on Facebook. The major reason for doing so for 23.53% of the respondents was “to hide myself”; 10.36% cited their reason as “to have fun,” and 1.54% “to attract attention.” Facebook also gives users a choice regarding who can see their profile information. Most of the respondents reported that they were likely to share information with their friends alone, including photos/videos posted by themselves (65.13%) and their friends (57.84%), wall posts posted by themselves (65.41%) and their friends (64.85%), profile information (65.97%), and contact information (64.71%). A rather surprising finding was that 13.03% of the respondents said they disclose contact information to themselves alone.

4.1. Results of testing for H1

H1, which predicts that Facebook users possess a concern for their privacy, yet their behaviours indicate an acceptance of Facebook's imposed privacy norms, that is to say, the perceived fulfillments derived from the Facebook experience will appear to outweigh the importance of privacy protection, garners support from the findings. The score for the former comprises 24 items and that for the latter eight. All of these items showed a very high degree of reliability, with an average Cronbach’s coefficient alpha of 0.91. Results of a paired-samples *t*-test indicated a significant difference between perceived fulfillments (mean = 4.18, SD = 0.64) and the importance of privacy protection on Facebook (mean = 4.35, SD = 0.74; $t(714) = -5.45$, $p < 0.0001$). This finding constitutes the first step in the formation of the Facebook privacy paradox. The finding suggests that respondents were more likely to pay attention to privacy protection than to the perceived fulfillments derived from using the SNS, directly indicating an increasing concern for privacy. However, as our results revealed, users’ actions do not always mirror their assessed concerns.

A paired-samples *t*-test was also performed separately to measure the difference between each of these 24 items and two mean scores. Four items (see Table 1) related to perceived fulfillments were each found to have a significantly higher mean score than the mean score of privacy protection at a 0.01 level of significance. It should be noted that these fulfillments were generally related to maintaining relationships, friendship, and entertainment. The result for the item “I have become a more responsible person by participating on Facebook” indicates that respondents took responsibility for constructing their identity through engagement in social interactions.

Table 1. Item mean scores of perceived fulfillments compared to mean score of the importance of privacy protection using a paired-samples *t*-test.

Items	Mean[1]	*SD*	*t*-Test	(*p*-Value)
I am entertained by using Facebook.	0.58	1.18	13.16	(< 0.0001)
I use Facebook to maintain social relationships.	0.32	1.37	6.26	(< 0.0001)
I get to delve into my friends' lives through Facebook.	0.27	1.28	5.63	(< 0.0001)
I enjoy Facebook because it allows me to share common topics with my friends.	0.15	1.40	2.89	(0.0040)
I enjoy the feeling of being cared for by others when I use Facebook.	0.15	1.62	2.50	(0.0126)
I feel my relationships with other Facebook users have become more intimate.	0.16	1.38	3.03	(0.0025)
I have become a more responsible person by participating on Facebook.	0.62	1.53	10.82	(< 0.0001)

Note: Mean[1] = mean of item - mean of the importance of privacy protection; level of significance = 0.01.

Surprisingly, there was a significantly positive but very weak correlation between the items "I have become a more responsible person by participating on Facebook" and "I am concerned with the consequences of sharing my identity information on Facebook" (r = 0.1245, p = 0.0009). The implication is that even though a respondent felt having become a more responsible person, he or she was little concerned about the consequences of sharing his or her own information on Facebook. The significantly positive correlation between the items "I have become a more responsible person by participating on Facebook" and "I am always concerned about my privacy on Facebook" (r = 0.5823, p < 0.0001), in contrast, demonstrated that the respondents were concerned about their privacy on Facebook to a greater extent if they felt that Facebook participation had rendered them more responsible. This indicates that the ritualised use of Facebook, which proliferates forms of privacy reactive behaviour, results in users who feel they are more responsible in the wake of privacy concerns.

The paired-samples *t*-test results presented in Table 2 show that each of the two items related to privacy protection had a significantly lower mean score than the mean score of perceived fulfillments. It can be observed that the respondents reported spending little time on adjusting their privacy settings even though they did not believe their personal information to be well protected on Facebook. Recall from the foregoing discussion that the overall result for the importance of privacy protection outweighed that for perceived fulfillments; the implication is that the respondents were aware of the privacy protection

concept, but seldom took action to ensure their protection. This concludes our prediction that users would possess an increasing concern for privacy, yet their behaviours would suggest an acceptance of Facebook privacy norms. The privacy paradox thus appears to be rather ingrained in Facebook users, who are behaving in ways that suggest concern but then display acceptance through behaviour adaptations.

Table 2. Item mean scores of the importance of privacy protection and perceived fulfillments using a paired-samples *t*-test.

Items	Mean[2]	*SD*	*t*-Test	(*p*-Value)
I am familiar with Facebook's privacy settings.	0.12	1.64	2.03	(0.0428)
I adjust my privacy settings from time to time.	0.49	1.48	8.90	(< 0.0001)
I believe my personal information is well protected on Facebook.	0.64	1.29	13.33	(< 0.0001)

Note: Mean[2] = mean of perceived fulfillments from channelling into ethical telos - mean of item; level of significance = 0.01.

4.2. Results of testing for H2

H2, which predicts that Facebook users are increasingly aware of the surveillance over their lives and that the increased awareness influences and proliferates reactive behaviour normalisation in frequent Facebook users, is supported by the results. The first five items composed the score for the ritualised use of Facebook and the other 12 items for surveillance awareness, and all 17 items demonstrated a very high degree of reliability, with an average Cronbach's coefficient alpha of 0.91. It was observed that users who practised habitual use of Facebook displayed evidence of behaviour that could best be described as a direct reaction to increasing awareness of surveillance, for example, sending private messages instead of posting on a friend's wall.

To better understand the relationship between the awareness of surveillance and the ritualised use of Facebook, the scores for the latter were divided into three groups, "high," "medium," and "low," by standardising the original score for such use to mean = 0 and standard deviation = 1. Respondents with a standardised score higher than 0.6 were defined as "high" ritualised users, whereas those with a score lower than -0.6 were defined as "low" ritualised users, and the remainder were classified as "medium" users. Two correlation coefficients were identified to investigate the relationship between the ritualised use of Facebook and awareness of surveillance on the SNS for the "high" and "low" groups.

For "high" ritualised users (ritualised use mean = 5.68, *SD* = 0.43), the ritualised use of Facebook and surveillance awareness were positively correlated, with Pearson's correlation coefficient $r = 0.2554$, $p = 0.0003$. Thus, these users were more aware of the surveillance over their life (awareness of surveillance mean = 4.33, *SD* = 0.79). The "low" ritualised users (ritualised use mean = 3.50, *SD* = 0.61), in contrast, were found to be less aware of this issue (awareness of surveillance mean = 3.68, *SD* = 0.65), as the two means were relatively lower, albeit still positively correlated ($r = 0.2829$, $p = 0.0003$), than those in the "high" ritualised case. In other words, whereas the users who reported using Facebook in a ritualised manner displayed greater awareness of surveillance, their non-ritualised counterparts were found to be less aware. The increase in normalised privacy awareness behaviours was also found to be positively correlated with "high" ritualised users. This suggests that excessive Facebook use leads to reactive privacy awareness behaviours being formed.

5. Implications and conclusion

Social media is now heavily intertwined with people's work, study, and everyday life. What is most concerning about users' acceptance of Facebook's stance on privacy is that over time accepting conditions as norms may become social legislating. The acceptance of Facebook's stance on privacy, and subsequently Facebook's continued practice, may result in a new online privacy paradigm being established as the accepted norm, the result of which may be a world in which privacy is significantly, and possibly permanently, reduced. The possibility of such an outcome makes the significance of addressing issues pertaining to user privacy on Facebook evidently clear. It is therefore essential that studies such as this on personal privacy continue to be undertaken and expand the awareness of how social media is evolving and penetrating into various aspects of society.

It is also of utmost importance that diminished rights for Internet users do not define the current period of social media evolution, as we demonstrate through the concept of "discipline-and-control social media." This study has addressed the issue of privacy on Facebook by placing it in the context of the power relationship between the SNS and its users. Shining a light on the imbalanced nature of this relationship, exhibited most clearly by the Facebook privacy paradox, has allowed us to grasp the true gravity of the current imbalance in a non-Western context. It can be asserted that negative outcomes, both social and economic, will result if the balance continues to skew. The new normal posed and elevated by the COVID-19 pandemic calls for more up-to-date and situated studies on privacy perception and protection such as this one that goes beyond the advocacy of media literacy and privacy awareness education.

In response to H1, the importance of privacy protection was found to outweigh to a significant degree the perceived fulfillments derived from using Facebook. It appears that as the respondents became more ingrained in the Facebook system, their perception of personal data accessibility was affected and this prompted them to seek a higher degree of privacy protection and greater control over their Facebook privacy settings. At the same time, however, the findings show that a large proportion of the respondents reported rarely adjusting their privacy settings and stated that they shared such personal information as their real name, date of birth, and personal photos. The survey results indicate that in a *renqing shehui* (networked society or society of favour), the sociality between known acquaintances and strangers still has a lasting impact and is strengthened through the network effect garnered through technology giants such as Facebook. The results also show that maintaining relationships with friends outweighed any privacy concerns the respondents had with regard to Facebook, even though they believed that the disclosure of information could lead to such serious consequences as surveillance and stalking. There is thus an obvious contradiction between how Facebook users think and how they act when it comes to privacy protection, which reveals the discrepancy between users' understanding and actions in defending their personal information and maintaining privacy on the SNS.

In support of H2, the survey results indicate that respondents were aware of the surveillance and control over their lives stemming from their use of Facebook, and the "high" ritualised users were found more likely to have had a superior sense of surveillance on Facebook than their "low" ritualised counterparts, who displayed little such sense. The result showing that ritualisation on Facebook was positively correlated to the extent of respondents' surveillance awareness also supports this argument. It suggests that the "low" ritualised users are the most vulnerable and therefore the most likely to have their privacy exploited. This also confirms our proposal of the "discipline-and-control social media" in the sense that "high" ritualised users develop and negotiate constantly with Facebook within a power dynamic. Conversely, "low" ritualised users have little capital to negotiate because their engagement is minimal; therefore, their power to counter the discourse being shaped and engineered by Facebook is limited. Nonetheless, these "low" ritualised users are still being controlled.

This study has several ethical implications for Internet governance and UX design. In the development of digital ecosystems, Internet governance involving multiple stakeholders as mentioned above may prove necessary if harmony is to be achieved in an international virtual platform on which millions or billions of selves are channelling voices expressing different extremes of opinion. For the design of UX, although freedom of expression should be protected as a fundamental human right, that protection should be balanced with the safeguarding of privacy as a shield against possible abuses of such

freedom. Foucault's panopticon metaphor is applicable to today's Internet environment to the extent that self-regulated behaviour and mutual respect are required of all users, with everyone conforming to a common set of rules. In the context of "discipline-and-control social media," control over users and platforms should be and is being negotiated, exemplified by platform regulation and surveillance, users' self-disciplining, and users' counter-control over platforms. Extreme applications of freedom of expression, including Facebook's engineered discourse on radical privacy transparency, may on the one hand lead to invasions of privacy and on the other lead individuals to become overly protective of their own privacy and experience the anxiety that goes with it. Eventually, and ironically, this will diminish users' desire to express themselves as the survey results in this study indicate. This should be an especially prominent concern for SNSs such as Facebook as they look to further increase their stranglehold on the global social media marketplace.

With regard to digital ethics, there is no question that Facebook users bear the primary responsibility for safeguarding their personal information. Yet, however, through UX functions that allow the editing of personal profiles, the uploading of pictures and videos, and the tagging of friends, users are encouraged to express themselves and to disclose more of their information through the voluntary sacrifice of privacy. Individuals' sense of sacrifice and sense of alarm over privacy violations are alleviated when disclosure is limited to their friends based on mutual trust and respect. Yet personal privacy can be particularly threatened when the newly added connections are not close friends. Users often retreat rather suddenly upon discovering that their privacy is at imminent risk. Therefore, UX designers bear the important task of balancing between usability and accessibility on the one hand and privacy and risk on the other. At the same time, if Facebook wishes to attract more users, then it has both the responsibility and an incentive to ensure that its platform is functionally and technically secure. In addition, user education is essential that those who make Facebook a part of their daily lives and work, whether "high" or "low" ritualised users, develop a deeper understanding of the site's operation and better familiarity with its privacy settings, especially as their social spheres expand.

Neither Facebook nor its users should consider the current privacy paradigm to be an end point. As social and professional communications are now taking place via complex and diversified service platforms that are new to human history, policymakers are inevitably being pushed to synchronise their legal and regulatory approaches to privacy protection with the rapid advancement and integration of information technology. The challenges they face are not limited to protecting Internet users' sense of security, which is a basic need that arises in people in the course of expressing themselves to and interacting with others; they also stem from the need to balance human beings' natural desire for

freedom of expression in social interactions with the necessary restrictions against and censorship of cybermedia to shield against privacy intrusion and cyberbullying. Privacy acts and related legislation and policies must, therefore, be regularly revisited and revised to meet the pressing need of regulating the virtual world while giving due consideration to the constitutionally guaranteed and fundamental human right to freedom of expression. In this respect, designers especially those responsible for UX innovations should be at the forefront of working with multidisciplinary stakeholders to create digital experiences that promote trust and accountability and to drive ethically responsible approaches that positively impact individuals, societies, and the environment.

Facebook, which currently enjoys an advantage over its competitors due to its extremely broad range of users of different ages, cultures, and views, could be used as a platform to educate users and raise their privacy awareness, thereby establishing a convergence of cross-cultural perspectives on balancing freedom of expression and privacy protection and providing a vision for the elimination of cultural and geographical barriers. Facebook holds a unique form of power in terms of control over its users' personal privacy through its influence in engineering and re-engineering privacy norms. Consequently, it is of vital importance for academics, designers, and policymakers to ensure the world's social media giant wields this power with due responsibility. Future research could therefore attempt to make cross-sector and cross-cultural comparisons on privacy awareness and practices using the same survey items as those used in this study. The quantitative measures could also be supplemented with in-depth interviews with Facebook users to obtain richer insights into their personal experience of Facebook use—such as preferences in privacy settings, levels of self-disclosure, and perception of social capital—contributing to the development of a more inclusive and desirable digital future. In addition, we believe that future research could benefit from comparative studies conducted across multiple digital platforms such as Facebook, Instagram, LinkedIn, Pinterest, TikTok, WeChat, WhatsApp, X, and YouTube, that would potentially reveal notable distinctions in content creation, media consumption, platform governance, user experience, information design, social interaction, and privacy protection strategies.

Survey instrument

For the survey instrument and detailed results, please contact the corresponding author. Thank you.

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EFFECTS OF VIRTUAL APPEARANCE AND CONVERSATIONAL STYLES OF AI VIRTUAL ASSISTANTS ON OLDER USERS' ACCEPTANCE

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ABSTRACT | Artificial intelligence (AI) increasingly assumes roles traditionally carried out by human assistants. AI virtual assistants can offer significant benefits such as convenience, efficiency, and personalized user experiences, making them critical equipment for customers and businesses (Mekni, 2021; Okuda & Shoda, 2018). One notable demographic that stands to benefit from AI virtual assistants is the elderly (Gessl et al., 2019). As people age, they may face functional disabilities and cognitive decline. Older people become vulnerable in various aspects of life. AI virtual assistants are posited to improve the quality of life for older adults by assisting with medication management, providing companionship, and supporting independent living (Mekni, 2021). In recognition of the elderly's unique needs, there has been considerable research exploring the use of AI virtual assistants in aging-related domains.

While numerous AI opportunities exist to facilitate the elderly, the current research often focuses on technological applications and their effects. These studies, however, overlook a critical aspect: the acceptance of AI by older users. Despite the widespread promotion of AI's potential benefits for the elderly, limited attention has been directed to how older adults perceive and accept these technologies. The studies investigating the acceptance of AI among older adults seem to emphasize cognitive factors such as perceived usefulness and perceived ease of use. While these elements provide valuable insights,

they fall short of addressing the broader and influential role of design in shaping user interaction and acceptance. Few studies examine how specific design features influence older adults' willingness to adopt AI technology. This study seeks to fill this gap by investigating how design elements of AI virtual assistants, specifically virtual appearance and conversational style, affect the acceptance of older adults.

This study employs a qualitative approach through one-on-one semi-structured interviews. We randomly selected 20 participants from 67 registerees aged 65 or older and residing in Hong Kong and conducted 1-hour interviews with them. Two comparative experiments were embedded within the interview process. The first experiment assessed the impact of two conversational styles: human-like versus mechanical style on user acceptance. The second experiment examined the effect of three levels of anthropomorphism on an assistant's appearance: high, medium, and low. After the interview, a small questionnaire was used to record older participants' acceptance levels of AI virtual assistants.

The finding reveals that a human-like conversational style and a relatively high level of anthropomorphic appearance foster greater acceptance of AI virtual assistants among elderly users. A human-like conversation could include the name of virtual assistants, a greeting, and a friendly tone. An anthropomorphic appearance indicates the use of realistic avatars. Additionally, older adults show a preference for assistants that are straightforward, easy to use and have clear instructions. The results suggest that when designing AI virtual assistants for the elderly, it is essential to prioritize human-like communication and a moderately anthropomorphic design to enhance user acceptance. These insights underscore the importance of tailoring AI virtual assistant design to meet the special needs and preferences of older populations.

KEYWORDS | AI VIRTUAL ASSISTANTS DESIGN, AI ACCEPTABILITY, AGING AND TECHNOLOGY, HUMAN-LIKE COMMUNICATION, ANTHROPOMORPHIC APPEARANCE

1. Introduction

Artificial intelligence (AI) is reshaping the landscape of human-computer interaction, increasingly fulfilling roles traditionally reserved for human assistants. AI virtual assistants (AVAs), in particular, have emerged as transformative tools that offer unparalleled efficiency, convenience, and personalization in various domains (Arora et al, 2020; Verhagen et al., 2014). From answering questions to facilitating customer interactions, these digital entities are becoming indispensable for both consumers and businesses. As the integration of AI into everyday life continues to expand, one demographic with much to gain from these advancements is the elderly.

The aging process often brings about a range of challenges, including functional impairments, cognitive decline, and a heightened sense of vulnerability in managing day-to-day tasks (Fisk et al., 2020; Pilotto et al., 2020). In this context, AVAs have the potential to play a pivotal role in supporting independent living, improving well-being, and enhancing the quality of life for older adults. Their applications span critical areas such as medication reminders, companionship, and assistance with routine activities, offering a lifeline for maintaining autonomy and reducing the burdens often associated with aging (Mekni, 2021).

Despite the promising capabilities of AVAs, their successful adoption by older adults remains uncertain. While existing research predominantly focuses on the technological

aspects and functional benefits of these systems, the question of how older users perceive and accept AVAs have received comparatively less attention. Acceptance of new technologies, particularly among older populations, is a complex phenomenon influenced not only be cognitive factors such as perceived usefulness and ease of use but also by the interactional and aesthetic characteristics of the system itself.

Notably, the design of AVAs, which encompass elements such as conversational style and virtual appearance, can significantly shape user experiences and influence adoption rates. For instance, a human-like conversational tone or a visually relatable avatar may help foster trust, comfort, and a sense of connection, particularly for users unfamiliar with advanced technologies (Araujo, 2018; Chen et al., 2024). However, empirical investigations into how such design features affect the acceptance of AI systems among older adults are sparse.

To address this critical gap, this study aims to answer what effects of different conversational styles (human-like versus mechanical) and levels of anthropomorphism in virtual appearances (high, medium, and low) are on the acceptance among older users. By employing a qualitative methodology involving semi-structured interviews and embedded experiments with older adults in Hong Kong, this research seeks to uncover actionable insights into the interplay between design and acceptance. The findings are anticipated to inform best practices in the development of AVAs, ensuring that these systems are not only functionally beneficial but also accessible and welcoming to all users, particularly those who may face barriers to technology adoption. Ultimately, this study aspires to contribute to the growing discourse on designing inclusive and user-centered AI systems.

2. Literature Review

2.1 AI virtual assistant

The AVA is an independent entity that offers a wide range of services to users, encompassing both technical and social assistance (Arora et al., 2020). AVAs operate in various capacities, including but not limited to administrative duties, customer service support, and social media marketing. These services can be used across diverse organizational settings, and the continuous training of virtual assistants contributes to the ongoing enhancement of work efficiency (Schmidt et al., 2018). AVAs leverage AI to interpret and respond to both spoken and typed commands. For instance, when a user requests information, such as asking for the weather or instructing the assistant to add a new event into the calendar, the assistant employs several technologies like Natural Language Processing (NLP) to comprehend the intent behind the query. Upon understanding the user's request, the AVA retrieves the relevant information or completes the specified task, such as providing weather updates or creating new events. Over time, AVAs improve their understanding of the user by learning from previous interactions, and they are even able to recognize individual voices and tailor responses based on user preferences (Arora et al., 2020).

2.2 Conversational style of AI virtual assistants

Natural language interactions between humans and AVAs play a critical role in shaping the overall user experience. Based on existing findings, machine-like communication tends to involve limited social interaction, whereas human-like communication

incorporates more informal elements such as greetings, small talk, feedback, and encouragement (Cassell et al., 2000; Chattaraman et al., 2019). Users increasingly seek natural and human-like interactions with computers, desiring conversational styles that evoke a sense of human connection (Araujo, 2018). A human-like conversational style tends to offer warmth and comfort to users, thereby fostering trust and enhancing the overall user experience. Cassell et al. (2000) emphasized the importance of incorporating interaction rituals, such as greetings and farewells, into these dialogues to strengthen users' trust. Roy and Naidoo (2021) explored the effectiveness of these conversational styles through scenarios in the hotel and smartphone industries, where the human-like style was described as more friendly, gentle, and personal. Similarly, Chen et al. (2024) revealed that human-like communication methods encourage users to disclose more information, thereby enabling chatbots to engage in more profound and meaningful interactions to gather relevant data.

While the human-like conversational style is increasingly favored, some studies suggest that a machine-like conversational style may be preferred in certain contexts. For instance, Cheng and Toung (2024) examined chatbots across different brands and concluded that top-tier brands should employ a more professional tone when communicating with customers, as it promotes a positive brand evaluation through a perceived greater match between the communication style and brand identity. Additionally, Zhu et al. (2023) found that consumers tend to prefer an instrumental communication style, one focused on achieving specific outcomes, particularly in high-pressure environments.

For older adults, preferences regarding conversational styles appear to be more nuanced. Harrington and Egede (2023) investigated the perceptions of older black adults towards health-information chatbots and found a preference for a natural conversational style. In contrast, Chattaraman et al. (2019) categorized older adults into two groups based on their internet competency—low and high—and discovered that high-competency users tend to require more emotional support, while low-competency users prioritize task-oriented interactions. Given these intriguing differences, this study aims to explore how older adults in Hong Kong perceive two contrasting conversational styles: human-like versus machine-like.

2.3 Virtual appearance of AI virtual assistants

The visual design of a virtual assistant significantly impacts user behavior, and it is crucial for designers to consider this factor when developing new conversational user interfaces. According to the social presence theory, it is possible to establish a sense of human-like interaction without actual physical contact (Gefen & Straub, 2004). This is achieved by fostering enhanced online interactions that create a sense of connection between the virtual assistant and its users (Baylor, 2009). The human-like visual appearance of AVAs plays a pivotal role in generating the social presence effect, thereby contributing to a sense of loyalty that users develop through their interactions with the virtual assistant (Belanche et al., 2021). The creation of an online social presence through the human visual characteristics of virtual assistants is also considered essential in providing a high-quality customer experience (Li & Sung, 2021; Verhagen et al., 2014).

Anthropomorphism refers to the attribution of human or personal characteristics to non-human entities or devices (Epley et al., 2008). Chattaraman et al. (2014) investigated the interaction experiences of older adults with two types of retail virtual agents: one featuring a persona image and one without. Their study revealed that older participants

demonstrated higher levels of perceived interactivity, trust, and intention to use the virtual agents that included a persona image. Similarly, Li and Sung (2021) found that individuals preferred AI virtual assistants with higher levels of anthropomorphism, evaluating them more positively. Priya and Sharma (2023) also observed that perceived anthropomorphism significantly influenced users' hedonic attitudes towards intelligent virtual assistants.

Recent empirical studies have confirmed that the level of anthropomorphism in a virtual assistant's appearance influences users' acceptance and adoption of AI virtual assistants. However, the specific impact on older users remains underexplored. To further examine how varying levels of anthropomorphism in the visual appearance of AVAs may affect the experiences of older adults, this study will explore three distinct levels of anthropomorphism: high, medium, and low. Gong (2008) developed 610 computer-synthesized facial images from various sources and invited undergraduate students to rate their degree of human-likeness, resulting in 12 images representing three levels of anthropomorphism. Schneider et al. (2019) examined the impact of anthropomorphism in a learning environment, utilizing blood cells depicted with no face, simple facial features, and more human-like faces to represent three levels of anthropomorphic design. These prior studies lay the foundation for us to create three-anthropomorphism-level images.

3. Methodology

This study employs a qualitative methodology to explore older adults' acceptance of and design requirements for AVAs. The research incorporates one-on-one semi-structured interviews and comparative experiments as its primary methods. To ensure the clarity and feasibility of the interview materials and procedures, a pilot study was conducted with 10 elderly volunteers. Following this preliminary phase, minor adjustments were made based on feedback, and the revised materials were subsequently validated. Participant recruitment commenced after the modifications were finalized.

This study will specifically focus on AVAs designed for banking services, using this platform to explore the experiences and preferences of older adults. The rationale for this focus is twofold: first, older adults often require more accessible and user-friendly banking assistants to resolve their issues without the need to visit physical branches (Cheng et al., 2024); second, the senior population tends to have a higher degree of familiarity with mobile banking, making it easier to conduct and illustrate the experiment within this demographic.

3.1 Participants and procedure

Participants were randomly chosen from a pool of 67 individuals, all of whom were residents of Hong Kong. The selection criteria were as follows: (i) aged 65 or above, (ii) possessing prior experience with mobile banking, and (iii) having some awareness or knowledge of artificial intelligence. To achieve a balance between manageability and diversity in the sample, a total of 20 participants were included in the study. Table 1 provides an overview of the participants' demographic characteristics. The sample comprised eight women and twelve men, with the gender distribution reflecting the larger proportion of male enrollees in the initial selection pool. This distribution is deemed representative of actual AVA usage patterns among older adults.

Table 1. Participants' demographic information

No.	Gender	Age	No.	Gender	Age
1	Female	65	11	Female	66
2	Male	73	12	Male	67
3	Female	65	13	Male	65
4	Male	71	14	Female	75
5	Female	68	15	Male	67
6	Female	67	16	Male	70
7	Female	67	17	Male	68
8	Male	70	18	Male	71
9	Male	68	19	Male	68
10	Male	69	20	Female	69

Before the interviews, participants were provided with an information sheet and required to sign a consent form to ensure adherence to ethical standards. Each interview session lasted approximately one hour, during which both qualitative and experimental data were collected.

The interviews consisted of four main components. In the first component, participants answered open-ended questions about their past experiences, perceptions of AVAs in financial services, and expectations. This approach facilitated the collection of baseline qualitative data. The second component involved presenting AVA-related materials to the participants and explaining current specific applications of AVAs in banking services. Participants were encouraged to ask questions freely during this phase to ensure they gained a comprehensive understanding of AVAs, which was essential for the subsequent experiments. The third component embedded two comparative experiments within the interview process, focusing on the influence of conversational style and virtual appearance on participants' attitudes. Participants observed various styles and designs of AVAs and engaged in guided discussions to capture their impressions and preferences. Finally, the fourth component included a short questionnaire designed to measure participants' acceptance of AVAs. The questionnaire comprised five Likert-scale items evaluating dimensions such as trust, satisfaction, comfort, resistance, and intention for future use. The questionnaire data provided a quantitative summary of participants' attitudes, complementing the qualitative findings.

All interviews were conducted in Cantonese, the participants' native language, to minimize language barriers and facilitate effective communication. With participants' consent, the sessions were audio-recorded and subsequently transcribed for analysis. The qualitative data were analyzed using thematic analysis to identify recurring patterns and insights, while the quantitative questionnaire data were summarized to support the overall evaluation.

3.2 Conversational style experiment

The first experiment examined how conversational style influences participants' acceptance by presenting two distinct interaction styles: a human-like conversational style, characterized by warmth and natural flow, and a mechanical style, which was more formal and robotic in tone. In this study, a scenario was created in which a user asked a banking assistant about the branch's opening hours. The humanized style has a greeting ("Hello") and AVA's name (Joy); the robotic style has no greeting and no name, as shown

in Figure1. The use of scenario-based manipulation aligns with prior research (Go & Sundar, 2019; Roy & Naidoo, 2021). Drawing from the literature, this study employed conversation screenshots, rather than live chats, to represent human-like and machine-like conversational manipulations (Chung et al., 2020). To isolate the impact of conversational style, no avatar images were included, thereby minimizing the potential influence of virtual appearance.

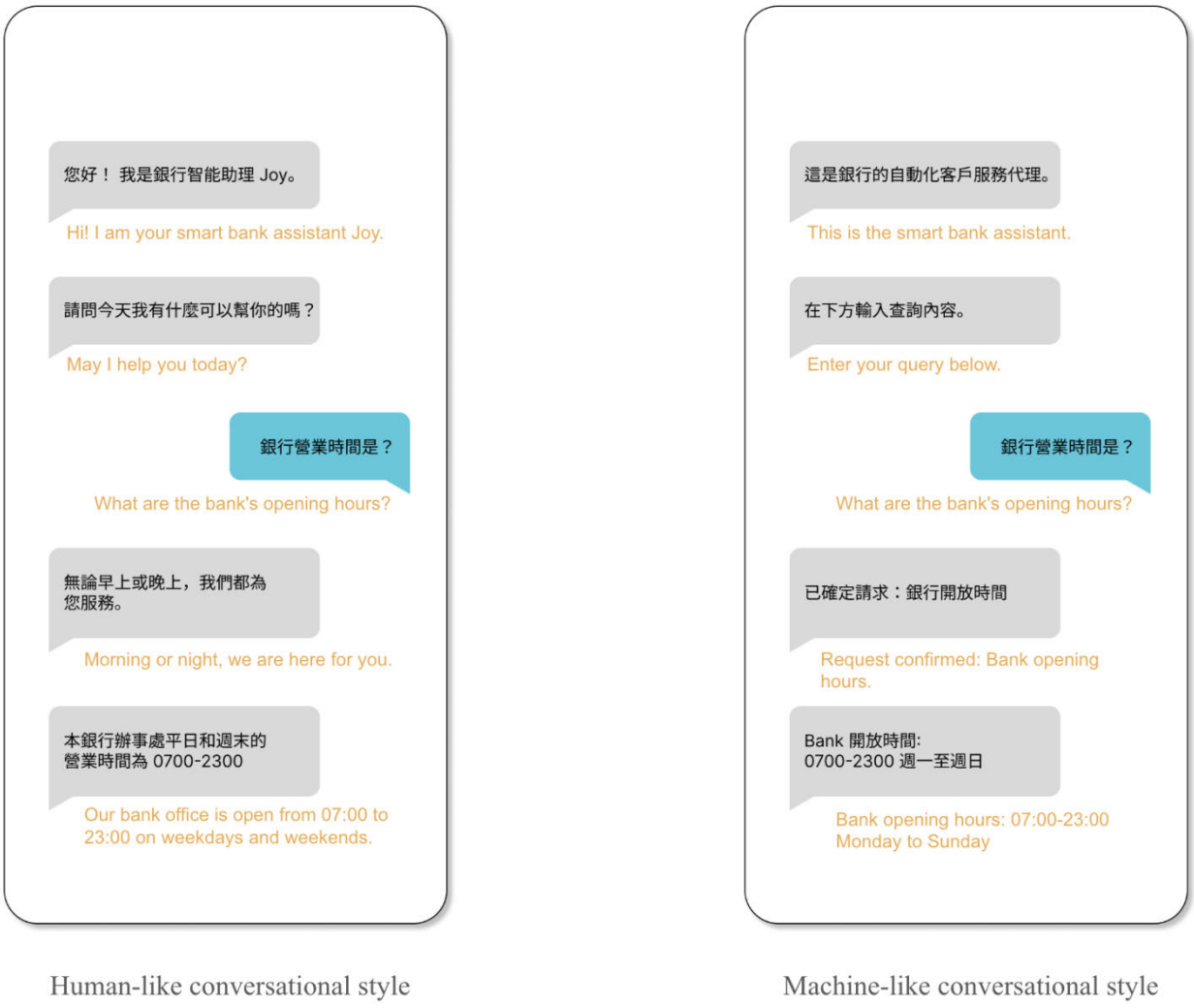

Figure1. Two conversational-style scenarios used in the experiment 1.

3.3 Virtual appearance experiment

The second experiment investigated the role of virtual appearance in shaping user preferences and expectations. To explore the effects of anthropomorphism, this study drew inspiration from prior research (Gong, 2008; Schneider et al., 2019). We categorized virtual appearances into three levels: no image or robot-like avatars for low anthropomorphism, animated character avatars for medium anthropomorphism, and real human images for high anthropomorphism. By observing the avatars commonly used in the Hong Kong market, we found that most companies choose female avatars for their chatbots. Therefore, we selected female images for both animated characters and real human representations in this experiment to enhance familiarity and comfort for older adults. Using female images consistently also helps eliminate the influence of

gender on decision-making (Fisk et al., 2020). Six interfaces (Figure2) featuring different avatars were designed and presented to participants, who were then asked to choose their preferred designs and explain. This approach provided insights into user preferences and the perceived impact of anthropomorphic design on the interface experience.

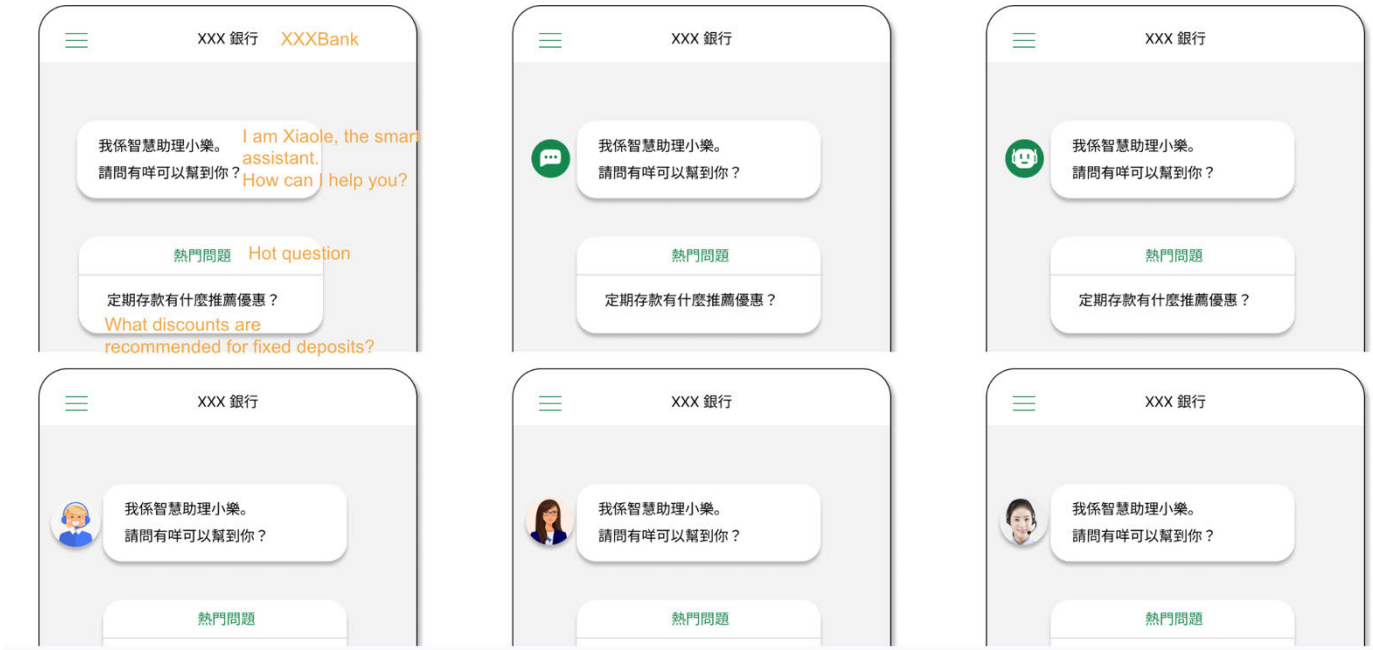

Figure2. Six avatars' images used in the experiment 2.

4. Results and Discussion

4.1 Conversational style preference

The majority of participants (n=13) expressed a clear preference for the human-like conversational style. This style was appreciated for its warmth, relatability and perceived empathy, which contributed to a sense of comfort and an enhanced user experience for older adults. P4 remarked, "*This is a more considerate service, more human, and more comfortable … It is not good to be too robot-like.*" Assigning a name to the virtual assistant was also highlighted as a feature that fosters a feeling of connection and closeness like interacting with real bank staffs. For example, P1 noted, "*AVA has a name that I can call and chat with, which makes me feel more comfortable.*" Similarly, P7 commented, "*It is like talking to a staff member.*" Participants frequently cited ease of understanding, the natural flow of conversation, and the ability to resolve queries in a personalized manner as key reasons for choosing the human-like style. For instance, P19 stated, "*This conversation is easier to read*" while P10 observed, "*It feels very direct. The machine-like style is a bit complicated.*"

In contrast, a smaller subset of participants (n=2) preferred the mechanical conversational style, associating it with clarity, simplicity and efficiency. These participants valued the straightforward nature of the interaction, devoid of unnecessary dialogue or human-like warmth, deeming it more suitable for functional purposes. P13 explained, "*I do not need humanized communication, and machine-like conversations are simpler and clearer.*" Additionally, a few participants (n=5) reported that their experiences were not significantly influenced by the conversational style, focusing instead on whether the AVAs could meet their needs. For instance, P12 stated, "*Just answer me directly. You don't need to introduce yourself. I know that the other party is an*

AI." Although these participants did not express a strong priority for either human-like or mechanical styles, they emphasized a desire for a direct and straightforward communication style.

While the majority of participants chose a human-like conversational style, the preference was not uniform. The findings suggest that, for older adults, human-like conversational styles are useful in creating comfort and fostering emotional connections, particularly in banking service contexts. However, mechanical styles were preferred by some participants who prioritized task efficiency and clarity. This indicates that context-aware adaptability in conversational style could significantly enhance user satisfaction. These results align with the findings of Chattaraman et al. (2019), who demonstrated that both human-like and machine-like conversational styles can cater to older adults' predilections in different service scenarios. Designers should, therefore, recognize the varied expectations of users based on their comfort levels with technology and personal interaction preferences.

Notably, some participants expressed concerns about a conversational style being "*too human-like.*" For instance, P2 reflected on a negative prior experience, stating, "*I know it is fake, I do not trust it… I did not believe it.*" This highlights the potential distrust or discomfort associated with the over-humanization of virtual assistants. Thus, while human-like conversational styles can cultivating a sense of intimacy, the degree of humanization requires further research. Murtarelli et al. (2021) similarly emphasized that the perceived level of humanness in interactions influences the credibility and perceived risks associated with virtual assistants. Future research should investigate how to ethically design human-like conversational interactions to ensure older adults feel cared for and experience an enhanced safety.

4.2 Virtual appearance preference

A significant proportion of participants (70%, n=14) expressed a preference for high-anthropomorphism appearances, specifically those utilizing real human images. This preference was frequently attributed to the sense of realism and friendliness conveyed by such representations. For instance, P4 remarked, "*It is just like chatting with a real person, so it gives you a feeling… This portrait will be more real.*" Similarly, P6 noted that "*It is better to have a portrait of a real person; it is more friendly.*" Some participants also highlighted the confidence they derived from high-anthropomorphism images. P14 stated, "*The others all look fake… Real people (pictures) are better and give me more confidence,*" while P7 commented, "*It feels like someone is answering me and can help me.*" Compared to medium- and low-anthropomorphism images, high-anthropomorphism visuals were reported to create a more comfortable experience, particularly for older participants. P10 and P13 both indicated a preference for real-life images and suggested avoiding avatar pictures if a realistic option was unavailable. These observations align with the findings of Li and Sung (2021), who emphasized the positive evaluation of anthropomorphic avatars when their design closely mirrors human characteristics.

Four participants expressed a preference for medium-anthropomorphism appearances, using animated images, citing them as more suitable in certain contexts. P2 described medium-anthropomorphism visuals as having "*enough feelings*" while P5 appreciated the warmth and care they could convey. However, some participants expressed skepticism about the necessity of anthropomorphism. P9 questioned the purpose of using real human images, stating, "*I do not know why I need to use this. There is no need*

to get a real person picture." Similarly, P18 preferred the artificiality of animated images, remarking, "*On the contrary, I like fake people because everyone knows they are fake.*" These findings suggest that medium-anthropomorphism representations may appeal to users who value emotional connection without requiring a realistic depiction.

Finally, two participants expressed a preference for low-anthropomorphism appearances, such as robot-like icons, citing the appeal of simplicity and transparency. P3 stated a dislike for the pretense of robots imitating humans, remarking, "*I know the person on the other side is a robot, so I do not want to pretend to be a real person.*" P8 similarly indicated a preference for robotic visuals, explaining, "*Overall, it is more comfortable, I think these robots.*" These responses highlight a minority perspective that values authenticity in robotic representations over anthropomorphic imitation.

The findings emphasize the significance of designing anthropomorphic appearance with user preferences and needs. High-anthropomorphism designs might be favored for their ability to foster a sense of realism, friendliness, and trust, particularly among older users who found them more relatable and comfortable. Medium-anthropomorphism designs appealed to users seeking warmth and emotional connection, though some preferred their artificiality over full realism. Low-anthropomorphism designs could be preferred by users who valued simplicity and authenticity, avoiding the imitation of human traits. These findings suggest that designers should carefully consider the level of anthropomorphism to suit the target audience, with high-anthropomorphism enhancing trust and relatability, while medium- and low-anthropomorphism may be more suitable in contexts requiring neutrality, simplicity, or explicit artificiality.

4.3 Older users' experience of AVAs

From the interviews, it was evident that perceived convenience is a key factor that enhances older users' satisfaction with banking assistants and increases their acceptance. Participants generally expressed that using a banking assistant could eliminate the need to visit a physical bank branch or wait in queues, thereby saving time. For instance, P9 noted, "*I believe it would be faster if we use a banking assistant. Going to the bank takes time, and even calling the bank involves waiting for someone to pick up.*" Additionally, the ability of banking assistants to provide services at any time was widely acknowledged. As P4 stated, "*As for the user experience, I think it is very convenient because you can perform operations anywhere at any time*." This always-available feature is particularly beneficial for elderly bank customers with limited mobility, enabling them to manage their financial matters more effectively.

Social influence also plays a significant role in user acceptance. Several participants mentioned that using a banking assistant reduces social stress by avoiding face-to-face interactions with staff. For example, P6 shared, "*Sometimes I have questions that I think are silly, but the AI chatbot won't laugh at me. I can talk to it about anything.*" Some participants also observed that interactions with AVAs avoid the emotional variability often encountered in human interactions, as the assistant maintains a consistently friendly tone. This makes the experience more comfortable, especially for users who feel uneasy during face-to-face interactions. For these individuals, AVAs offer a more accessible and less intimidating way to engage with banking services.

However, operational difficulties pose significant barriers to adoption among older adults. Age-related physical limitations, such as poor eyesight, were frequently cited as challenges. Participants emphasized the need for larger fonts, simpler interfaces, and less

reliance on lengthy text input to accommodate their needs. For instance, P9 remarked, "*Because of my age and poor eyesight, sometimes I can't read my mobile phone clearly. I wait until I get home to use my iPad.*" Similarly, P12 stated, "*For elderly users, the font size is too small. The mobile phone is already small; the font should be larger.*"

In addition to usability concerns, elderly users expressed reservations about the ability of banking assistants to provide personalized and accurate investment advice. Many felt that face-to-face interactions with banking staff are necessary to gain a better understanding of their preferences and risk assessments. Furthermore, limited familiarity with technology heightened concerns about operational errors and security issues. Traditional banking services, which share transaction risks and offer a higher perceived level of security, were seen as more reliable. For example, P13 remarked, "*If the investment fails, I can't afford to be angry with an AI chatbot.*" P5 similarly expressed skepticism, stating, "*Speaking of AI assistants now, I don't think they're trustworthy at the moment.*"

5. Design Implications

Adjusting conversational settings for older adults: To accommodate the diverse conversational preferences of older adults in various contexts, designers must conduct thorough user research to determine whether humanized, warm, and engaging expressions or more professional, efficient, and direct prompts are better suited for specific scenarios. For instance, while older adults may prefer human-like conversational styles in banking assistants, designers should adopt a case-by-case approach. In task-oriented services, a consistent and robotic tone may prove more efficient and favorable. A generalized solution to address these varying preferences could involve providing an option for users to select the depth of interaction and preferred communication style at the beginning of a conversation.

Leveraging anthropomorphic appearance: To improve the acceptance of older adults, it is essential for designers to evaluate the influence of anthropomorphic elements on user comfort in different contexts. In the case of banking services, high-anthropomorphism designs, such as those incorporating realistic human images, are particularly effective for older users, as they foster trust, friendliness, and relatability. However, other applications may require medium or low levels of anthropomorphism. For example, medium-anthropomorphism, such as animated images, strikes a balance between emotional warmth and artificiality, making it suitable for platforms where older users seek human-like connections without expecting complete realism, such as communication tools. In contrast, low-anthropomorphism designs, characterized by robotic or minimalist icons, cater to users who prioritize simplicity and transparency, which may be more appropriate for technical applications. Offering customizable levels of anthropomorphism can accommodate individual preferences, enabling older adults to select the appearance they find most comfortable and engaging, thereby enhancing user satisfaction.

Age-friendly interface design: Designers must consider the unique requirements of older adults to improve accessibility and usability in digital services such as banking assistants. Key design considerations include addressing age-related physical limitations, such as poor eyesight, by integrating larger, adjustable fonts, high-contrast visuals, and simplified navigation layouts. Interfaces should reduce reliance on lengthy text inputs, favoring intuitive, voice-based, or guided interactions instead. Furthermore, alleviating social stress and fostering user confidence can be achieved by employing consistent and friendly tones in AI interactions, thereby eliminating the fear of judgment that can arise in human communication. Offering 24/7 availability and seamless functionality empowers elderly users with limited mobility to manage their tasks conveniently from home, further

supporting their independence. Nevertheless, ensuring trust and security remains critical, as older users often view traditional in-person interactions as more reliable for high-stakes activities, such as investment decisions. By aligning interface design with these considerations, digital services can promote inclusivity, improve user satisfaction, and facilitate wider adoption among elderly populations.

6. Ethical Considerations

This study aims to promote inclusivity and enhance access to digital services for older adults. Given the involvement of a vulnerable population, several ethical considerations arise. First, we respected participants' autonomy and dignity during data collection. All interviews were conducted with informed consent, and participants were made aware of the purpose of this study, their right to withdraw at any time, and how their responses would be used. We also ensured that the language and format of materials were accessible and appropriate for older adults. Second, we selected female avatars for both animated characters and real human images based on observations of existing chatbot designs in the Hong Kong market. This choice was made to enhance familiarity and comfort for older users. However, we recognize the importance of avoiding gender stereotyping and plan to explore gender dynamics in future studies (Feine et al., 2020). Third, we maintained ethical standards in data processing. All collected data were anonymized before analysis to protect participant identity and no personal identifiers were retained. The data were stored securely and were accessible only to the research team. Overall, ethical awareness was integrated throughout the research process, from study design and participant recruitment to data handling and interpretation, to ensure that the design is respectful and inclusive.

7. Conclusion

Our findings underscore the critical impact of design features, particularly conversational style, and virtual appearance, on the acceptance of AI virtual assistants by older adults. The results reveal that a human-like conversational style, featuring personalized elements such as names, greetings, and a friendly tone, and a higher level of anthropomorphism in appearance foster more acceptance. Older adults also expressed a preference for assistants that are straightforward, and easy to use. These insights emphasize the importance of tailoring AI virtual assistant designs to accommodate the specific needs and preferences of elderly users. By prioritizing human-like communication and moderately anthropomorphic designs, designers can improve the accessibility and acceptance of these technologies among older populations.

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ENHANCED (AI)NSPIRATION: BRIDGING SYSTEMIC COMPLEXITY WITH AI AND HUMANITY-CENTERED DESIGN

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ABSTRACT | The *Enhanced (AI)nspiration* methodology addresses the increasing complexity of global design challenges by expanding Human-Centered Design with Humanity-Centered Design, Systems Thinking and Generative AI. The methodology focuses on the Inspiration Phase of Design Thinking, to enable designers defining problems systemically, anticipate unintended consequences and better align solutions with societal and ecological goals. Key hypotheses tested include AI's potential to empower systemic exploration, preserve and even enhance human creativity and critical thinking while meeting practical limits of the design process. The study explored how AI can support problem framing and decision-making within a modular design framework. Validation activities included a workshop and pilot projects spanning diverse fields. Feedback highlighted efficiency gains, enhanced empathy and deeper systemic insights but also underscored risks like over-reliance on AI and challenges with synthesizing data, which informed a subsequent strengthening of the methodology with embedded risk mitigation. The results illustrate AI's role in supporting systemic analysis and decision-making, enhancing the designer's agency throughout the process. The methodology's 37 AI-driven prompts, structured into a Handbook to facilitate implementation in design education and practice, provide flexibility and adaptability to diverse design contexts. *Enhanced (AI)nspiration* aims at empowering designers to acknowledge their dual role by addressing systemic challenges as problem solvers while anticipating and mitigating unintended consequences, advancing design's ethical and holistic impact.

KEYWORDS | AI-augmented Design, Systems Thinking, Humanity-Centered Design, Ethical Design, Inspiration Phase, Problem framing, Complexity management

1. An urgent responsibility for designers

Designers today rely on methodologies like Design Thinking (DT) and Human-Centered Design (HCD), which prioritise individual needs and foster empathetic, user-friendly solutions across industries. However, global challenges like climate change, unsustainable economic systems and social inequality have intensified the need for designers to acknowledge the duality and broader consequences of their actions.

While addressing specific needs, design solutions can inadvertently trigger ripple effects beyond their initial scope. Recognising this has prompted decades of discourse on expanding traditional methodologies. Victor Papanek's *Design for the Real World* (1971) warned that neglecting complex intersections of stakeholders, social structures and technical factors could lead to resource depletion, pollution and societal breakdown. Don Norman's *Design for a Better World* (2023) further urges designers to adopt broader responsibilities and perspectives, incorporating societal, ecological and political dimensions to achieve long-term positive impact.

Navigating this systemic complexity, including an ethical and efficient use of emerging technologies like Generative AI (AI), calls for new, flexible and advanced toolkits. The critical stage of the design process, where initial research, context analysis and problem framing have an intrinsic systemic complexity (Norman & Stappers, 2015), is the Inspiration Phase of HCD (IDEO.org, 2015), where this research has identified the opportunity to integrate Humanity-Centered Design (HCD+) and Systems Thinking (ST), emphasising root-cause analysis, long-term perspectives, and balancing human and planetary well-being.

This study addresses a specific research question in this framework: How can AI, framed as a dialogic partner, support designers in integrating systemic and humanity-centered principles, anticipating unintended consequences, and reducing externalities while sustaining agency, creativity, critical reflection and complexity management?

The authors introduce the *Enhanced (AI)nspiration* methodology as a complementary addition to existing design workflows, accompanied by a Handbook to support its practical implementation. The methodology comprises a modular collection of structured and adaptable AI prompts devised to assist designers during the Inspiration Phase, encouraging broader systemic inquiry, deeper exploration, and ethical reflection while preserving full agency. Tested through two experiments in a design education environment, preliminary findings indicate that the methodology shows promise as a pedagogical aid and potential for broader adoption in professional settings, helping designers always remain at the centre of the process, with AI enhancing their critical thinking, creative depth, and process efficiency.

2. A new foundation for defining design challenges

Design theory continues to evolve, enriched by diverse epistemological and ontological approaches that foster innovative tools and frameworks to address modern challenges (Norman & Stappers, 2015; Boehnert, 2018; Boylston, 2019; Norman, 2023). As Norman (2023) highlights, two perspectives stand out for their transformative potential:

Humanity-Centered Design (HCD+) and Systems Thinking (ST).

HCD+ extends traditional Human-Centered Design (HCD) by addressing the interconnectedness of people, ecosystems and the environment. It focuses on tackling systemic root causes, balancing immediate needs with long-term impacts and fostering community collaboration for sustainable, contextually relevant solutions. It bridges dualities such as global and local, human and ecological while promoting harmony between humanity and the planet, as outlined in the *United Nations Sustainable Development Goals* (UN SDGs). Compared to HCD, HCD+ is newer and less structured in its activities (Gorichanaz, 2024).

ST, as articulated by Donella Meadows in *Thinking in Systems* (2008), offers a holistic approach to understanding complex systems by exposing non-linear causalities, relationships, feedback loops and patterns. It identifies systemic root causes, highlights key actors and emphasizes long-term impacts. Applicable across industries, ST enables decision-makers to identify leverage points and develop sustainable solutions by analyzing interconnected elements rather than isolated components. Amissah et al. (2020) emphasize that ST equips designers to approach change holistically by fostering motivation, enhancing collaboration, refining focus and encouraging continuous learning. Jones et al. (2022) show that combining these approaches into practical frameworks enhances design practice.

Recent studies have highlighted the potential of Generative AI (AI) to support different stages of the design process. Xu et al. (2023) explore how AI can help embed ethical principles beyond technical requirements. Khanolkar et al. (2023) map AI capabilities across engineering design phases, showing a focus in current research on ideation and feasibility assessment. Han et al. (2024) and Tschepe (2024) also examine AI's role in concept evaluation, data extraction and scenario exploration.

Few studies have explored how AI could act as a true dialogic partner, a tool that supports designers in asking broader, deeper and better questions, structuring systemic inquiry and reflecting critically on their assumptions. This gap is particularly relevant during the Inspiration Phase of HCD, where designers immerse themselves in users' contexts to understand needs and challenges deeply, fostering empathy and laying the foundation for the design process (IDEO.org, 2015).

This paper seeks to integrate established methods and tools from HCD, HCD+, and ST into a modular, AI-augmented methodology devised to complement - not replace - existing design workflows. The structured prompts tested with this study aim to help designers manage an increasing amount of information, anticipate systemic impacts, and embed ecological and ethical considerations in the early stage of the design process.

3. Building the Enhanced (AI)nspiration methodology

The research conducted to define the *Enhanced (AI)nspiration* methodology had two main goals:

- to collect and to structure relevant activities, tools and approaches derived from Human-Centered Design (HCD), Humanity-Centered Design (HCD+) and Systems Thinking (ST) for the Inspiration Phase;

- to integrate Generative AI (AI) as a dialogic partner to help manage the complexity of both challenge and process dimensions while retaining - or even enhancing - designers' agency.

To achieve these goals, the study analysed foundational works in each domain, including *The Field Guide to Human-Centered Design* (IDEO.org, 2015), *Design for the Real World* (Papanek, 1971), *Design for a Better World* (Norman, 2023) and *Thinking in Systems* (Meadows, 2008). The study evaluated each method and tool for relevance to the Inspiration Phase's goals, such as context analysis, primary and secondary research and problem framing. These insights have been categorized into a unified framework of 34 key methods and tools (18 for HCD, 5 for HCD+ and 11 for ST), structured into five sub-phases: Challenge, Planning, Research, Synthesis and Opportunities (see Table 1).

Table 1. The 34 key methods and tools collected from HCD, HCD+ and ST useful for the Inspiration Phase.

Phase	Human-Centered Design	Humanity-Centered Design	Systems Thinking
1. Challenge	Frame Your Design Challenge Define Your Audience	UN SDGs Correlation Reference Communities	Boundaries Actors Goals
2. Planning	Create a Project Plan Build a Team	/	/
3. Research	Secondary Research Interviews Expert Interviews Extremes and Mainstreams Immersion Analogous Inspiration	Reducing Prejudice	Stocks Flows Feedback Loops Delays Self-Organization Hierarchy Resilience
4. Synthesis	Empathy Maps Affinity Maps User Personas User Journeys User Stories Problem Statements Insight Statements	/	/
5. Opportunities	Opportunity Areas	Incremental Implementation TRIZ Analysis	Leverage Points

The authors conducted a series of experiments to evaluate AI benefits for each identified method and tool. Starting from defined design challenges, several AI prompts have been

developed, tested (with *OpenAI ChatGPT model "4o"*, retrievable from www.chatgpt.com) and refined following OpenAI's *Prompt Engineering Guide* (n.d.).

These tests demonstrated AI's potential as a dialogic partner, helping manage complexity in both challenge and process dimensions. The key results are summarized, for each sub-phase, as follows:

- *Challenge.* AI helped identify the system's boundaries, actors, and goals, uncovering historical path dependencies that shaped current constraints. It revealed hidden interactions and systemic contradictions, enhancing problem clarity and understanding intricate system dynamics with a reflective approach.

- *Planning.* AI helped match required expertise with project needs, organized resources, and identified affected stakeholders. It ensured a holistic view of issues and skill gaps, supporting effective resource allocation and structured, ethically guided research plans.

- *Research.* AI helped streamline primary and secondary research by optimizing interview and immersion setups, automating data collection and analysis, producing concise summaries, and uncovering patterns. The bias removal dialogic approach ensured balanced, multidimensional perspectives. Insights grounded the process in real-world data and broadened understanding of key issues such as conflicting forces and interests within the system.

- *Synthesis.* AI helped aggregate data into actionable formats, highlighting recurring themes and contradictions. Integrating tools like Empathy Maps and Insight Statements clarified user needs and opportunities, guiding empathetic identification of transformative design directions.

- *Opportunities.* AI helped challenge key assumptions before prioritizing innovation areas and explored high-potential system contradictions worth solving. It pinpointed leverage points for impactful solutions, providing a well-informed foundation for the subsequent Ideation Phase.

Insights from these preliminary evaluations have been distilled into 37 specific AI prompt types, tailored to the methods and tools in Table 1. These prompts were organized into five sub-phases: Challenge (6 prompts), Planning (3 prompts), Research (15 prompts), Synthesis (7 prompts), and Opportunities (6 prompts).

The prompts demonstrated adaptability, allowing relevant sets to be selected independently, modified to address emerging topics, and tailored to the specific requirements of each initially defined design challenge.

Figure 1 presents a schematic overview of the methodology's key methods and tools, guiding the process from initial context exploration and systemic problem framing to the identification of ethically grounded, high-potential opportunities. The methodology is specifically designed to support the formulation of well-framed design challenges, leading the designer up to the threshold of the Ideation Phase of HCD.

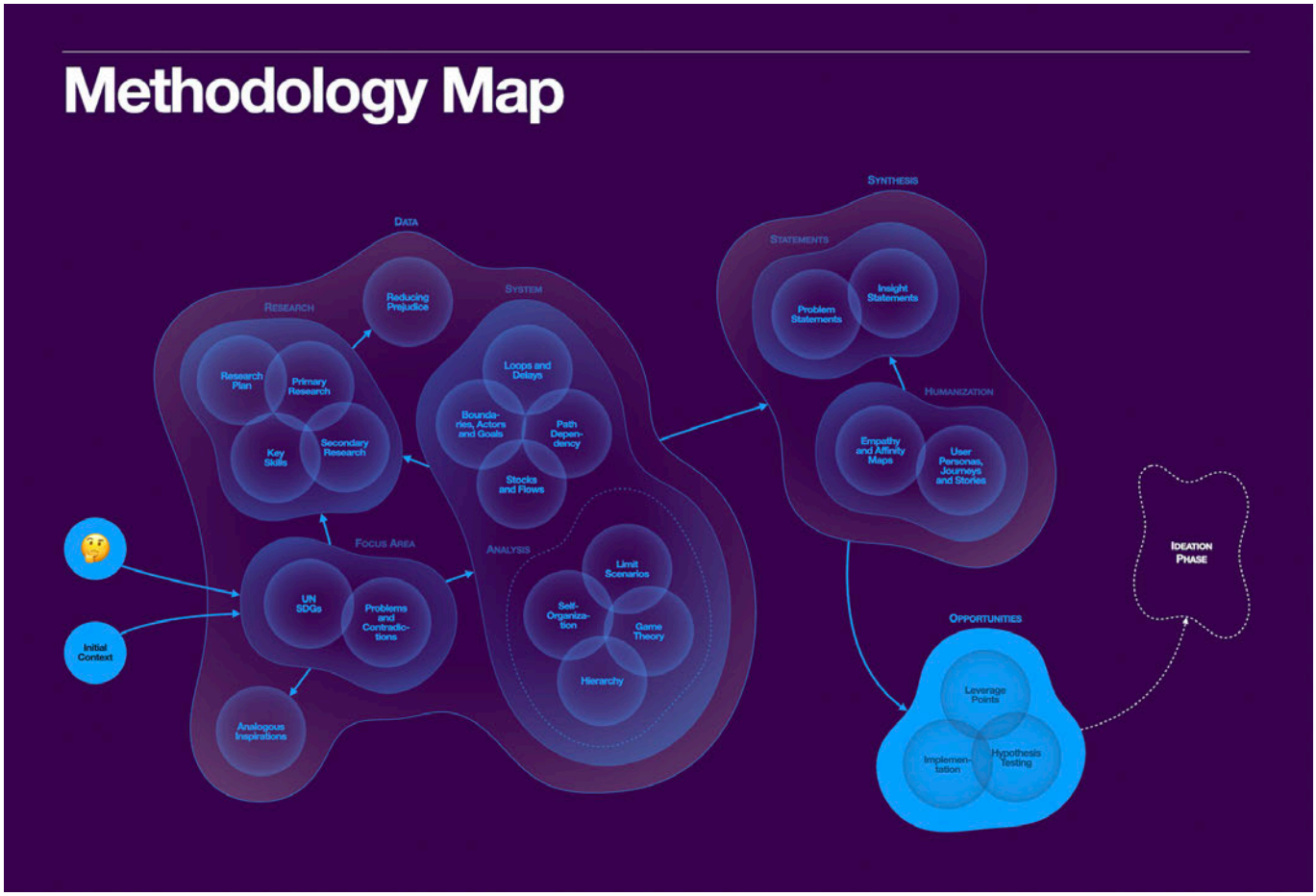

Figure 1. Enhanced (AI)nspiration: a schematic overview of the key methods and tools in the methodology, from initial context exploration to ethically grounded, high-potential design opportunities.

4. Testing the methodology and learning from feedback

The *Enhanced (AI)nspiration* methodology validation was guided by the following key hypotheses:

- combining Human-Centered Design (HCD), Humanity-Centered Design (HCD+) and Systems Thinking (ST) while integrating Generative AI (AI) as a dialogic partner would enhance designers' ability to broaden and deepen their perspective when framing design problems while preserving creativity, intuition and control over the process;
- AI would help designers manage the complexity of the resulting design process;
- the methodology's modular prompts could adapt to diverse design contexts while maintaining focus and efficiency.

Two experiments in an academic environment with design students have been conducted to test the methodology. This choice was informed by the authors' combined expertise - decades of experience in design education and equally long background in professional practice - offering complementary insight into both pedagogical and applied design contexts. The first experiment has been conducted in a workshop at University of Politecnico di Milano in June 2024 in collaboration with the *James Dyson Foundation*, which involved 23 advanced design students working on projects in the field

of Design for Kids. The authors introduced the first version of the methodology in a lecture, presenting a concise selection of 17 key AI prompt types (due to time constraints) focused on foundational activities within the Inspiration Phase. The prompts were structured as sheets detailing each activity's purpose, input requirements and expected outputs, with guiding examples for clarity (see Figures 2 and 3). Participants were tasked with designing a new product or service for children, spanning all three phases of HCD (Inspiration, Ideation and Implementation), applying the methodology in the Inspiration Phase.

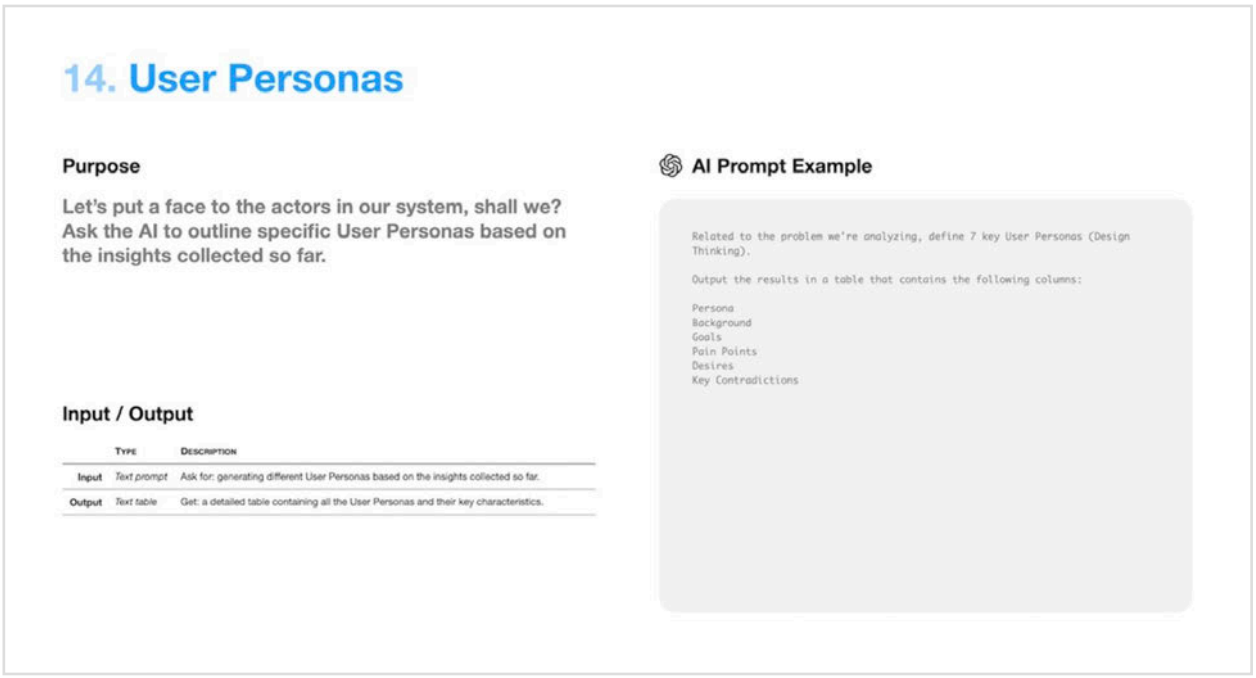

Figure 2. The first version of the methodology presented two distinct pages for each of the prompts. Here, an example of the first sheet describing the purpose, expected input/output and a practical example of the AI prompt for the specific activity.

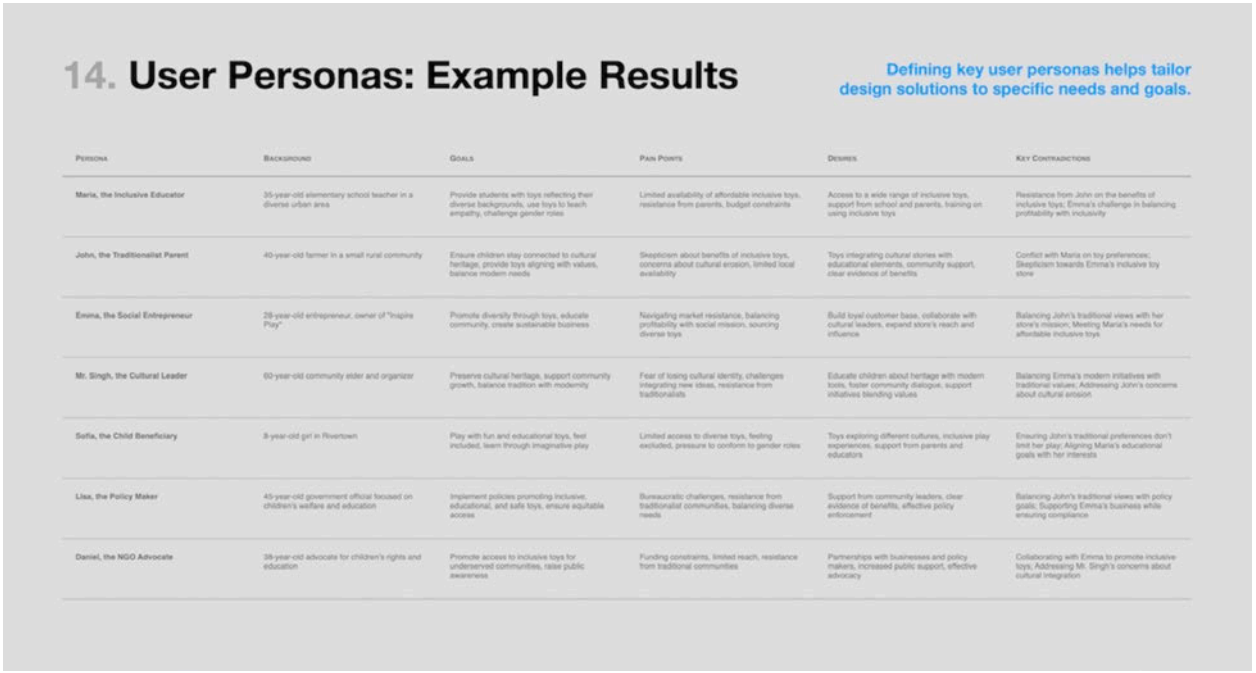

Figure 3. The first version of the methodology presented two distinct pages for each of the prompts. Here, an example of the second sheet, showing an example of possible result for the AI prompt shown in the first sheet.

Students were chosen as their evolving workflows enable clearer observation of how the methodology influences process, framing, and decisions compared to traditional HCD approaches. A workshop survey assessed participants' familiarity with AI and the methodology's utility and efficiency. Results showed that 43% used AI casually in design, 43% outside design and 14% were new to it. Despite varying experience, 86% found the methodology very or extremely useful, with 71% noting significant positive impacts. Participants praised its ability to streamline data, foster empathy and clarify systemic interdependencies. However, they highlighted challenges such as sometimes overly lengthy AI responses and difficulty synthesizing information. Concerns included AI potentially hindering critical thinking without proper use. Suggestions included implementing concise summaries and more precise instructions for integrating prompts into workflows.

The second experiment was conducted with two pilot projects in two courses with design students involved in the development of an urban furniture system and a wearable device for emotional development in children. The authors were directly involved in the process alongside the students, allowing them to apply their combined academic and professional expertise while critically reflecting on the methodology's performance in real time. Thanks to structured AI prompts, students have been able to systematically identify interconnected factors operating across different levels - such as historical path dependences, stakeholder relationships, and long-term system behaviours - which were not explicitly addressed in initial HCD-driven approaches. This expanded the problem space beyond immediate users, fostering a broader consideration of indirect actors and long-term consequences. The methodology also facilitated critical self-questioning around design assumptions through bias-awareness and contradiction-analysis prompts, contributing to more robust challenge definitions. During the tests, the authors recognised the need to work on sometimes overly lengthy AI responses and the risk of AI hindering critical thinking, as emerged during the workshop.

The validation activities highlighted significant qualitative benefits. Timesaving and efficient data analysis were notable. The methodology improved data quantity, quality and depth, enabling to navigate socio-technical complexity and conduct wider and deeper analyses. Iterative synthesis reduced information overload, maintaining focus on critical areas. AI helped reveal unexpected connections, fostered innovative insights and supported complex scenario simulations, enhancing systemic understanding. It also helped mitigate unconscious biases, ensuring balanced perspectives and improved research planning by identifying relevant themes, skills and participants within given time and resource constraints.

The validation also revealed a key insight: AI did not replace the central role of the designer. On the contrary, the process highlighted how critical thinking, creativity, and empathy remained essential for transforming AI-generated insights into meaningful, context-sensitive research insights. Ethical judgment, rooted in human experience, guided socially and environmentally responsible decisions while ensuring relevance and impact. Flexibility and intuition proved indispensable throughout the assessment in navigating complex scenarios and interpreting AI suggestions with critical discernment. Direct engagement with users, interdisciplinary collaboration, and the capacity to manage uncertainty emerged as irreplaceable human contributions.

These validation activities provided a robust foundation for strengthening and refining the methodology to reach its advanced version, as described in the following section.

5. Strengthening the methodology and addressing risks

Following validation feedback, the authors improved the methodology with key refinements:

1. the need for a design tool: a preliminary tool (Handbook) has been designed as a comprehensive guide structured around the five phases of the methodology. Each phase was introduced with a dedicated panel summarizing its purpose, methodologies and activities, color-coded to improve navigation (see Figures 4 and 5).

Figure 4. Methodology's Handbook introductory sections help designers better understand information at a glance.

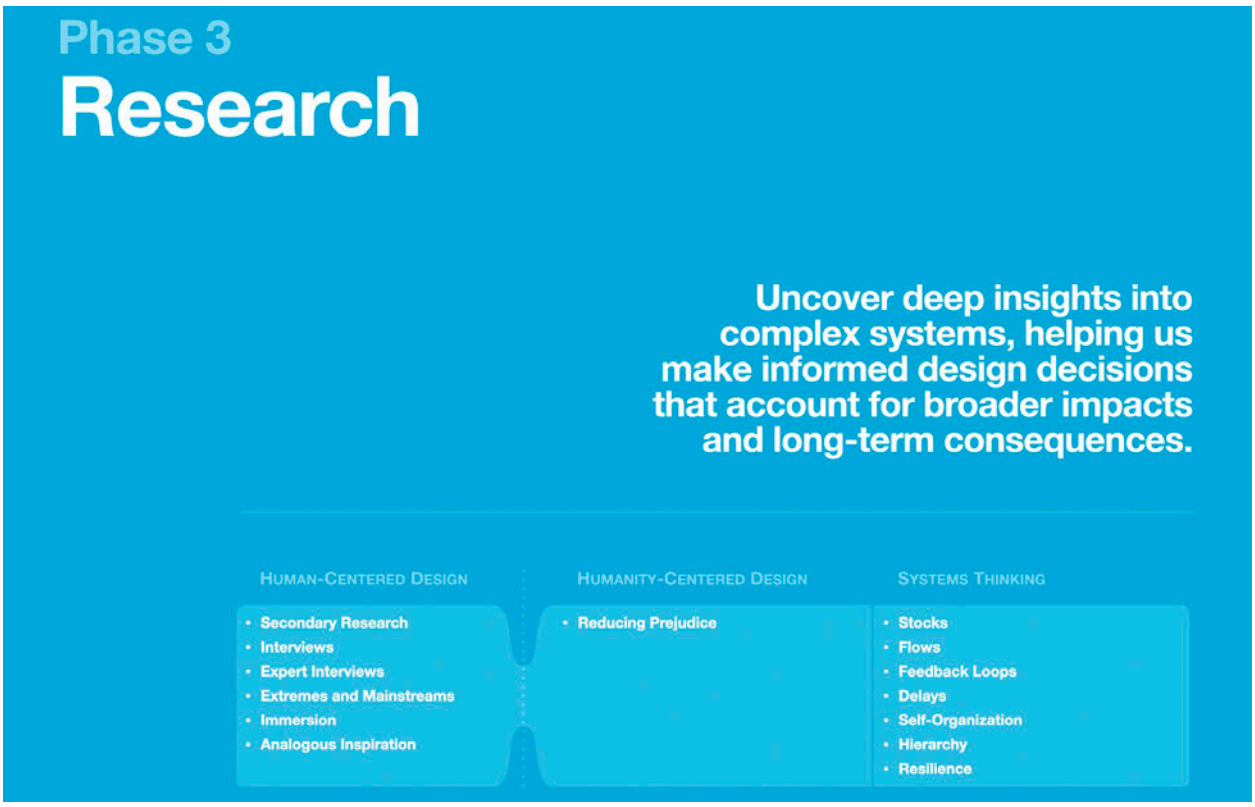

Figure 5. Methodology's Handbook introduces a specific phase with a brief description and specific methods and tools used.

2. the need for a clear connection with HCD, HCD+ and ST tools and methods: a major integration to the methodology has been the detailed and actionable information for each step (see Figure 6) to established design methodologies via a "Proven Methodologies Compass," including tools to help designers synthesize results. This improvement addressed feedback collected during the validation activities to ensure more clarity and accessibility:

    - clear explanations of Generative AI (AI) integration, specifying its purpose, benefits and expected outputs;
    - explanation of the methodology's principles, motivations and foundational values;
    - customizable AI prompts tailored to each activity;
    - example outputs in a readable, less overwhelming, tabular layout.

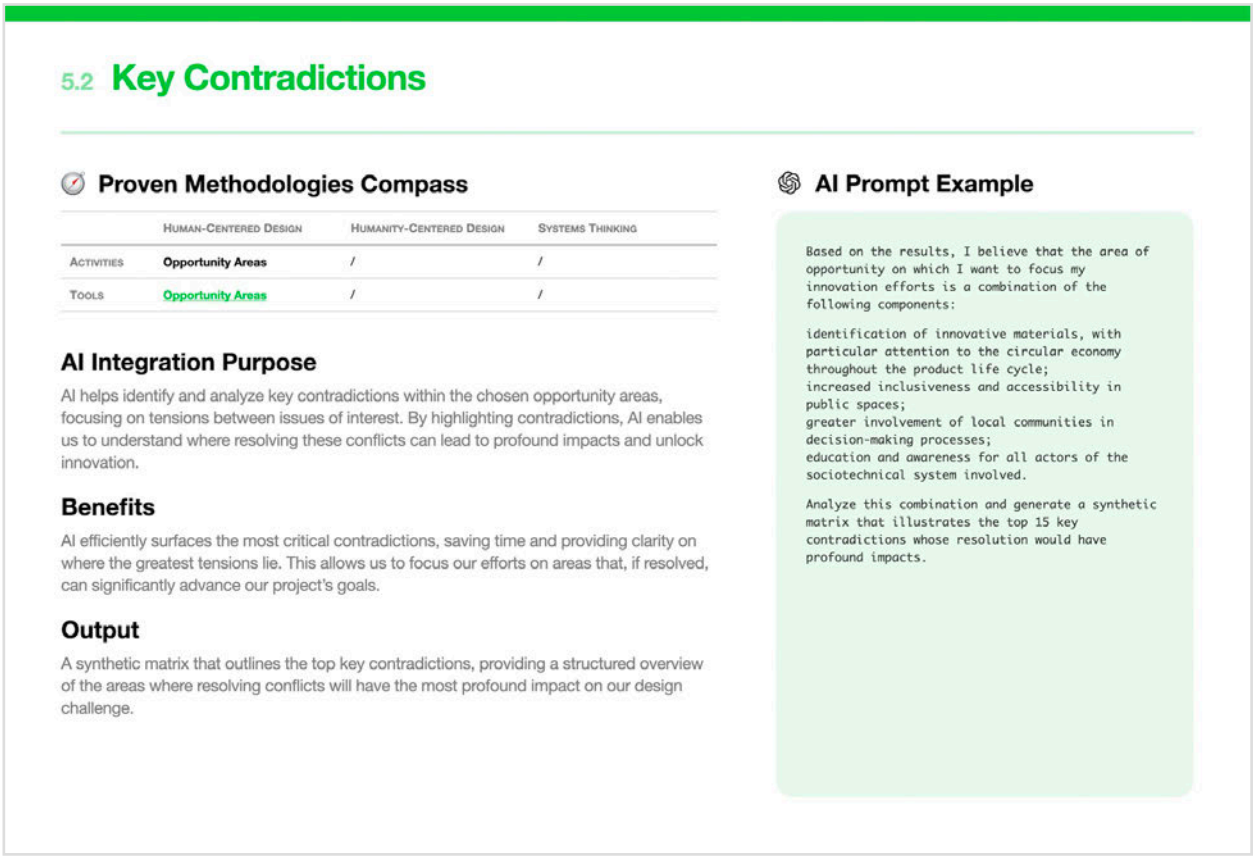

Figure 6. Handbook typical activity sheet, helping designers better integrate the specific step into their workflow.

Following feedback from validation activities, the *Enhanced (AI)nspiration* methodology acknowledged the risks inherent in integrating AI into the design process and embedded solid safeguards to mitigate them. A key risk was over-reliance on AI-generated suggestions, which could undermine critical thinking, empathy and creativity. To mitigate this risk, the methodology emphasized the designer's central role in decision-making, framing AI as a supportive tool rather than a substitute and reinforcing the importance of thorough primary and secondary research.

The methodology also addressed biases and inaccuracies in AI outputs, often stemming from opaque training datasets (a limitation expected to improve with future AI models). It prioritized human-led verification through robust human-centered research activities

(like ethnography, observations, field immersion, etc.) and included prompts to help designers critically assess data and reduce biases. Technological risks, such as irrelevant or erroneous AI responses, were mitigated through verified prompt examples and strategies for tailoring interactions to project needs.

To avoid standardization or homogenization of solutions, the methodology encouraged adapting prompts to specific project contexts, preserving the uniqueness and diversity essential to design. The Handbook also emphasized core values prioritizing cultural sensitivity and innovation, guiding designers to navigate complex challenges responsibly.

By embedding these safeguards, *Enhanced (AI)nspiration* ensured a more dynamic and balanced integration of AI into ethical and impactful design practice.

6. Future research directions

The *Enhanced (AI)nspiration* methodology has current limitations requiring future exploration. Field validation in diverse professional contexts would strengthen its applicability while introducing quantitative business metrics to measure efficiency, impact, and return on investment, which could provide clearer insights into its value for stakeholders. Expanding the methodology to include the Ideation and the Implementation Phases would create a comprehensive framework, bridging research, concept development and execution.

The methodology's dialogic nature could make it a valuable tool in design education, fostering continuous learning and raising awareness about Humanity-Centered Design and Systems Thinking. This potential - particularly in terms of learning outcomes, behavioral changes, and long-term impact - warrants further investigation. Deeper exploration of these aspects could strengthen the methodology's contribution, equipping future designers to navigate complex challenges with a systemic perspective and heightened ethical responsibility.

7. The role of Enhanced (AI)nspiration in design leadership

Designers are increasingly challenged to address systemic, ethical and interdisciplinary demands that traditional methodologies like Human-Centered Design (HCD) alone cannot fully address. This paper introduced the *Enhanced (AI)nspiration* methodology, which builds upon HCD, Humanity-Centered Design and Systems Thinking, integrating Generative AI (AI) as a dialogic partner to navigate the complexity of modern design challenges.

The methodology demonstrated its effectiveness in refining the Inspiration Phase, offering tools to frame problems systemically, manage complexity and align design with long-term societal and ecological goals. Its modular AI prompts, validated through workshops and pilot projects, streamlined research and synthesis, providing actionable insights while preserving the designer's critical role.

Enhanced (AI)nspiration benefits a wide range of users like design students, educators,

product and service designers, strategic designers, innovation teams, and interdisciplinary researchers by empowering them to approach challenges holistically, balancing innovation and ethical responsibility. Future research should expand the methodology's scope, validate its application in diverse industries and explore its impact quantitatively, reinforcing its role in advancing design practice and education.

Further insights will be collected throughout critical discussions on the methodology's structure with the scientific community.

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Enhancing Assistive Products for Older Adults with AI: The Role of Artificial Intelligence in Personalization, Independence, and Reducing Stigma.

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Artificial Intelligence (AI) is transforming assistive products for older adults by addressing the limitations of traditional technologies. Many existing devices, such as walkers, hearing aids, and medical alert systems, lack adaptability and personalization, which limits their effectiveness. These devices often carry a stigma, being visibly associated with aging and dependency. Many older adults hesitate to adopt these technologies due to discomfort with digital tools or unfamiliarity, further diminishing their utility. The absence of universal design principles makes these products functionally and aesthetically misaligned with the diverse needs of older adults globally. AI offers a path to transform assistive products into adaptive, intelligent systems that support independence and dignity for older adults.

A survey assessing AI-powered technologies among older adults revealed that while some seniors had access to these tools, they needed to be sufficiently personalized to meet their individual needs for independent living. Highlighting suboptimal user experience, with smart devices needing to be more intuitive and easier to use. This underscores the need for more intelligent, user-friendly solutions (Sweeting et al., 2024).
AI enhances assistive products by enabling real-time data processing, predictive analytics, and personalized care. Using AI to monitor health data from wearable devices and smart home sensors predicts risks such as falls or medical emergencies before they occur. These systems improve everyday tasks by adjusting lighting to prevent falls, offering voice-assisted reminders for medications, and detecting irregular patterns of movement that may indicate health concerns.

Incorporating universal design principles into AI-driven technologies can reduce stigma and improve product acceptance by making devices accessible, intuitive, and adaptable to a broader range of users. AI-based personalization further enhances user experience, allowing assistive devices to evolve with the changing needs of older adults and fostering greater independence and dignity (MacLachlan et al., 2018).
In conclusion, many existing assistive products for older adults need to be more adaptive and often stigmatize users. AI and emerging technologies offer a promising future by transforming these devices into intelligent, personalized systems that enhance functionality and dignity.

AI in Aging, Smart Wearables for Seniors, Assistive AI Technologies, Fall Detection AI Systems, AI-Powered Smart Homes for Older Adults, Predictive Health Analytics for Aging, Personalized AI Health Monitoring, Universal Design in Aging Tech, Inclusive AI Solutions for Seniors, Digital Health Innovations for Aging Populations.

Addressing the Gaps: The Role of Artificial Intelligence for Aging Populations to Enhance Assistive Technologies

The rapid integration of Artificial intelligence AI into assistive technology products for seniors is growing quickly. With a rapid increase in the senior population globally, expected to exceed 1.5 billion by the year 2050 (United Nations, 2020), personal use of adaptive assistive technologies and smarter systems is in much higher demand. As technology advances, people are getting smarter and much more aware of the new innovations in the technology domain, especially with artificial intelligence technology advancements of how it is helping the global population but neglecting the growing senior population. The most prominent concern is that mostly the younger population is getting exposed to the use of AI. Many algorithms are getting trained by their inputs and not by the seniors as much, which is leading the datasets to not be in sync with the older adults and eventually having inaccuracies in recommendations and inaccuracy with answers or assistance provided to them.(Obermeyer et al., 2019)

The most recent advancements with AI for seniors have been done in the field of predictive healthcare, homes becoming smarter, some prominent categories of mobility aids being enhanced and advancements in the cognitive support systems. Some examples being remotely monitoring health systems which can detect early signs and abnormalities in human beings including neurogenerative disorders and even cardio vascular diseases and also prediction the risk of falls in seniors being the biggest reason for seniors to lose their independence (Alexandru et al., 2022). Tools developed by MIT media Lab such as MemPal provides memory assistance for managing daily tasks for seniors with cognitive impairment(Maniar et al., 2025)

Technologies at home such as smart hone devices have advance fall detection and also monitor emergency situations reducing and even eliminating the need of smart wearable device es by the use of wireless technology which can analyse wave dorms to detect abnormal movements in senior care housing and movement in homes (S. Wang et al., 2019). Furthermore, with the advancement in the autonomous automotive industry, developing and testing the autonomous vehicles, AI powered mobility aids can address reflexes and mobility challenges faced by seniors(Veras et al., 2025). AI is also prominent in enhancing social connectedness by introducing social robots and virtual companions which can engage in interactions with seniors but fail at making meaningful relations for a longer period. There assistive companions can become tools for mitigating loneliness and dependencies while enhancing the need of emotional wellbeing of the rising senior population.

1. Gaps in Recent Advancements: Leveraging Artificial Intelligence to Enhance Assistive Technologies for Aging Populations

On the other side the healthcare sector is advancing with the advancements of AI algorithms to improve medical and clinical decision making. A recent study at Standford's deep AI learning algorithm can assess mortality risks based on patient profiles that further enables in planning for end-of-life decisions and discussions. Also, recent tech enables diagnostic tools that having a huge impact on identifying diseases like dementia through advance speech analysis and MRI scans but all this either remains

in research or not accessible to all with a rage in artificial intelligence overlooking its need for the growing senior population.
Accessing to the recent advancements, the $60 million investment by the national institute on aging is establishing AI collaborators with the Johns Hopkins University in order to develop personalised Ai solutions for seniors (Moore et al., 2019). This collaboration will mainly focus on involving all the stakeholders to work with the advancing AI language and algorithms themselves to train AI with the unique needs off the aging population.

With the advancements in AI specifically tailored for the younger population including kids, there is a lot of recognised advancements but the traditional devices such as mobility aids, example wheelchairs, crutches, and even hearing aids, there are huge challenges and notably not a lot of industries are not working with them in order to advance them by adding the artificial input to make it functionally present for today's times and the times to come. Be it lack of adaptability, limited options of personalisation and even hesitations due to acceptability and stigmatic factors, the aging populations not being addressed particularly(MacLachlan et al., 2018).

AI solutions, that are available as open source, are limited by natural language processing(NPL) for seniors but has the capability to process prompts for solutions real time singing creative intuitive tools that can evolve using personalised senior needs(Chen et al., 2023)

2. Artificial Intelligence: The Emotional and Psychological Impact and prevailing gaps

Social isolation and being lonely are some of the most challenging situations that are faced by senior in today's times that lead to adverse and mental health outcomes. Various researches suggest that prolonged loneliness and social isolation leads to a significant risk of depression connected to cognitive decline and mortality (Holt-Lunstad et al., 2015). Some studies have shown that companionship models using AI can improve the overall well-being of seniors by fostering social isolation and reducing loneliness (Wu, 2022)

2.1 Artificial Intelligence – Emotional connectedness and AI

A product designed specifically for seniors, ElliQ, for examples is a social companion that works on advanced models of AI than the existing google homes and Alexa, engaging older adults by providing reminders, having healthy conversations and also touching the emotional aspects of senior conversations to promote healthy behaviours with seniors (Broadbent et al., 2023). Research also compares AI driven companionship with human interaction bringing an outcome that suggests AI interactions can have similar psychological benefits during the phases of loneliness and depression. Older adults who engaged regularly with AI companions reported reductions in feelings of loneliness and an improved sense of social connectedness in a study by(Anjum et al., 2021)

Despite all these promising results, there are still concerns that remain regarding emotional authenticity and the ability of AI to replicate genuine human relationships with emotions and not just plastic boxes connected to the internet can solve all the prevailing issues related to seniors with emotions and psychological disturbances.

2.2 Artificial Intelligence and the concerns of mental health in seniors.

AI-powered virtual assistants and chat bots offer psychological support by engaging seniors in various types of conversation be it mental health support of catering to their questions or demands, monitoring emotional states and providing solutions when required (Fiske et al., 2019). Beyond companionship, AI has been applied increasingly to support the mental health of older adults. This intern is also benefiting in reducing the symptoms of depression and anxiety in seniors specially with those how have very limited access to the traditional therapies while aging(Tielman et al., 2019)

AI has advanced in the field of emotion recognition that further enhances mental health support by detecting and responding to user's emotional state. Ai-driven models can assess and analyse the tone of voice, facial expressions and various types of language models and adjust resonances accordingly (Tian et al., 2024). However, ethical concerns arise regarding the accuracy of these language models developed with biases and prominent intake by specific user groups in regard to emotion recognition and risks associated with data collection. AI models need to work towards transparent ethical strategies for ensuring accuracy with user content that remains a challenge.

2.3 Improvement in memory and cognition through AI

Decline in human cognition is significant in the aging population that affects memory, problem solving capabilities and even attention. There are advancements in neuroscience and brain training program by the application structured by AI which are gamified and developed to mitigate these challenges (Livingston et al., 2020). Research have proven that AI driven cognitive trading can improve functioning and memory retention with the aging population and a perfect example being MemPal that uses personalized cognitive exercises that enhances individual's performance and responses that offers an interesting and personalised way to maintain the enhanced cognitive function. Detecting early signs of decline and actively responding to them has also been a great part of the AI driven systems monitoring cognitive performance over time.

Larger datasets can be used to understand behavioural patterns by training machine learning modules by even flagging details of onset of neurodegenerative diseases such as Alzheimer's can find deviations and act on them but the effectiveness of AI in diagnostics and treating cognitive decline has a lingering way to go with further studies to prove long term impact (J. Wang et al., 2023).

2.4 Ethical considerations with mental health and AI

There is a significant rise in the ethical, accessible and privacy concerns with AI even after having enormous benefits of its developing models. The key issue remains data privacy as thesis AI models collect a lot of sensitive user information related to health and wellbeing's of the growing senior population (Reddy et al., 2020). Another ethical issue being seniors not able to connect deeply with the ever-growing AI models because of their user experience with systems and subsystems.

The grown aging population is the least familiar with the AI interfaces, Language models and daily advancements which affects their engagement and interaction with this complex technology. Therefore, AI designers, User experience experts and developers should work towards a universal design approach ensuring that assistive technologies are accessible, intuitive, and adaptable to the diverse needs of aging users also taking care of the AI bias that also remains as one of the biggest challenges as the many AI models are trained on datasets that lack adequate representation of older adults, potentially leading to inaccuracies and misdiagnoses (Caliskan et al., 2017).

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3. AI-Powered accessible assistance for seniors at home - Aging in place.

3.1 Introduction to AI powered accessibility

There is an increasing need for intelligent smart home solutions and environments for the rising global aging population to enhance independence, safety and a better lifestyle for older adults. And with this need AI powered smart home advancements are on a rise as well by offering more optimised potential solutions that could support the aging population as well by maintaining autonomy and remote access while reducing burden on caregivers.

These smart home solutions include home automation systems, health monitoring devices, fall detection systems and even voice assistants, but they have been always available from almost a decade now and the new advancement is the integration of AI that further is not personalised for the senior population. Despite these technological advancements with the use of AI, there are huge risks and adoption barriers among the aging population that makes it even more important to evaluate and work towards the potential and limitations for the use of AI in smart home system for older adults.
The use if Internet of Things, machine learning and now the long language models with AI should create a personalised and enhanced responsive environment for the seniors

3.2 AI smart home solutions for Aging users

The applications and advancements of Amazon Alexa, Google home and even Apple intelligence are very popular among the younger demographic and is advancing day by day with immense usage by the customers and the Ai models are getting trained faster than ever leaving the aging users behind as they do not have as much input as the younger population.

There are systems furthermore offer gimmicky applications like hands free interactions, voice inputs for small daily tasks like controlling home devices to writing using AI generated models or even correcting the tone of the language, but their application in assisting older adults remains controversial. People with visual impairments and hearing disabilities are still benefiting from the available AI models that can improve accessibility for those individuals with mobility, hearing and visual impairments that further helps

them in living an indented lifestyle but on the other had adoption of such technologies or even awareness is low with the aging seniors. Some of the significant reasons being unfamiliarity with the interfaces or very complex models that even the younger population is not exploring due to ill presence of self-intuitive user expressive with devices and services (Periša et al., 2025).

Studies suggest that research done with voice assistants and senior make them struggle to understand functionality and these models fail, that they do certainly because ion newer updates day by day, due to low vocal projection or wen cognitive impairments. Moreover, privacy concerns related to AI-driven voice assistants, in context to passive listening and data collection, have been cited as significant deterrents to widespread adoption (S. Wang et al., 2019). The current systems to move towards enhancing the accuracy of natural language processing models and ensuring transparent and ethical data policies that intern might be effective for the senior population to latest start adopting AI as assistive technology. Predictive care including remote or live health monitoring represent another crucial application of AI-powered smart home integration for the aging adults.

AI-enhanced smartwatches and wearable sensors now enable live tracking of physiological indicators such as heart rate, and sleep patterns, and oxygen saturation allowing for real-time assessment of health status and early detection of potential medical issues.

Adding to this smart home automation systems are useful but are not targeted towards seniors. Using the specs of the smart home systems enabling automated lighting adjustments, security protocols and even climate control can be personalised to the needs of older adults. For example, AI powered in home smart lighting systems can automatically adjust based on their movement patterns which in turn reduces their risk of fall without much manual intervention and keeping them mentally at peace for living independently. AI powered appliances can regulate room temperatures, notify when food is ready, set reminders, detect any leaks or damage in the house and alter caregivers and remote family members if even doors are open.

Studies prove that smart home systems can improve the quality of life for aging adults by reducing the need for physical exertion and incidents of accident (Marino et al., 2023). But the big gap can be noted where many older adults find it difficult to set up and rely alone with these technologies and now with daily advancements with AI, highlighting the need for more universal and inclusive onboarding experiences and accessible technical support services (Zamudio-Rodríguez et al., 2020)

3.3 Challenges in AI-Integrated Smart Homes for Seniors

Smart home products such as Nest Protect, Walabot Home, and Apple’s Fall Detection feature is enabled by compute vision and advanced algorithms that work digitally with the physical product, machine learning, and motion sensors to identify falls in real time, giving an advantage to inform caregivers or first responders immediate information to rescue a fall.
Studies have shown that AI-based fall detection systems can improve response times and reduce the severity of fall-related injuries by facilitating immediate medical intervention (Vasoya et al., 2023). However, there is a massive gap in understanding the present ecosystem and user experience connected to it as it has not been designed or developed keeping various aspects of the needs of the aging population such as affordability, privacy, language, mental and physical state of seniors and the real-world adoption remains limited due to issues such as false alarms, device accessibility

concerns, and resistance among seniors to continuous monitoring. To enhance the user experience and make seniors trust o these devices, future AI-driven fall detection solutions must prioritise accessible, inclusive and unobtrusive design, personalised user experience with alert systems that can reduce unnecessary distress while ensuring timely intervention when necessary.

4. AI-Powered Health tracking technology for Seniors

4.1 Introduction to the advancements in wearables for health care in Aging.

As the aging population grows, the demand and need for intelligent, AI-enhanced wearable health devices has grown substantially. These intelligent, previously smart, wearables provide predictive future insights, in various aspects of health including cardiovascular health stats, neurodegenerative readings, diabetic overview of the body (Shajari et al., 2023). It is considered that these wearables let seniors to monitor their heath stats from home, reducing the burden on health care providers and systems but professionally working with such brands for over a decade and having that knowledge, either they end up being mimics or because of cost the AI powered systems are not up to the mark for giving accurate data and end up being a lifestyle product that might help seniors in emergency situations.
And with all the advancements, many barriers remain, including cost, digital literacy, usability concerns, brands and solution developers using high quality sensors and even a personalised approach for seniors to enhance their user experience by designing and developing intuitive and inclusive AI powered wearable products. This part of the research focuses on the capability, reliability, challenges, and future directions of AI-powered wearable health technology for older adults.

On one side wearable health technology has undergone significant updates in recent years, with artificial intelligence leading in personalised health monitoring advancements focusing on various chronic diseases and even predictive healthcare and exploring the new sectors where it can be useful in the future. AI-powered wearables provide innovative approaches to promote independence with seniors as that is one of the main aspects that studies prove about seniors, and with the use of these real time diagnostics at home reduces seniors to visit hospitals frequently and take care when the devices suggest by real time tracking.

Advancements in components available now but not used due to high costs of chipsets and sensors of wearables such as biosensors for diabetes, accurate heart monitoring, mental health state medical wearables with a high-end AI model now integrate features including fall detection, heart health management, tracking sleep patterns, and diabetes management to provide active health care systems (Heikenfeld et al., 2018). But integration of heath AI bots that can be accessible to seniors which not only provide live health status but also help them create their diet plans or enhance their daily food intake that in turn affects their health through validated sources, will be an intelligent approach of using Artificial intelligence.

4.2 Market available intelligent Health Monitoring Wearables

One of the most significant contributions of AI in wearable health technology is its ability to provide continuous, passive health monitoring. Devices like as the Garmin watches, Whoop health band and the latest Samsung Galaxy devices with their integrated personalised AI solutions tap into the machine learning algorithms indicate sleep patterns, hearth heath, daily walking steps and even blood oxygen levels, But this was only useful and came out like gimmick features during and post pandemic. Studies also indicate that these special health devices can track and inform about irregular heart rhythms, as atrial fibrillation (AFib), and indicate early warnings for potential cardiac events (Wilmink et al., 2020)

Another big advancement in the neuroscience sector for the human brain activities, AI-models and solutions for electrocardiogram (ECG) features are available and are being tested in wearable devices that allow older adults to conduct mental and physical health assessments without visiting a hospital or doctors, that in turn reduces their medical costs keeping them stress free of the dependency to visit caregivers or

even doctors reducing the stress of thinking about aging all the time.

Real time and all-time glucose monitoring (CGM) systems, such as Dexcom G6 and now the new and refined Dexcom G7 and Abbott's Freestyle Libre, are ready to use and provide analytics to provide custom insulin management suggestions for individuals with diabetes (Demiris et al., 2004). And very prominently brands like Ultrahuman and Noise from India are designing and developing, AI powered smart rings, such as the Luna Ring, that works with the sleep patterns and metabolic data, that was never an aspect that worked on with as wearables are really not the products humans can wear and sleep but products like smart rings are on a finger and not hinder with the daily life activities.

And with the advancement of these flexible chipsets used in these devices, brands are also proactively working with thinner AI engine and apps too provide customised and personalised offering insights into fatigue management, stress management, and overall lifestyle and wellness. These AI powered smart wearable devoices can support the growing senior population toward a better stress free and analytically ready future, that minimises the need for reactive medical interventions. AI-powered wearable biosensors are also gaining attention and being developed on a faster pace with models getting advanced for their ability to predict the future health impacts from their daily activities and identify health risks based on always on real-time physiological data.

Again, With all these products present in the market and advancing, first, these products are not tailored towards the older population, being the ring sizes or even understanding the fatigue of wearing these devises by older adults, that hinders with the product to be effective universally and has an inclusive design and development approach with user experience prominently those who lack digital literacy and cannot cope up with daily advancements and updates (Charness & Boot, 2019).

Accordingly, seniors require simplified user experiences and interfaces personalised to their requirements, larger and accessible displays, and easy to use applications on their smartphones to increase and improve adoption rates. And also, another aspect mention in the previous sectors where AI creates a risk is working on data privacy as these devices, once designed and developed as lifestyle products not are gathering one's personal health data and using them in order to learn but many other factors can let people use this for wrong means and that is why AI powered smart wearables still consists of significant barriers to widespread, inclusive and universal use.

4.3 AI-Enhanced Fall Detection and Emergency Response

Toady with all the technological advancements, even the best caregivers and nurses can't be with different patients at the same time. Even with skilled caregiving professionals present, a resident fall can happen instantly that can have massive disturbing impacts on seniors, caregivers and even hospital organisations. Fall prevention powered by artificial intelligence enhances the peace of mind for busy nursing teams, seniors and even their close ones even if they are constantly motoring their loved lone.

Here a compilation of the smart homes connect to the smart wearable can proactively help in keeping the aging population safe by connectedness to various systems and preventing falls. Falls are one of the most affective causes of injury-related accidents among seniors, that makes fall detection and monitor the epitome of application and use in order to prevent injury-related hospitalisations and Advance AI Systems and wearable devices have significantly improved fall detection accuracy, with machine learning algorithms analysing motion patterns to distinguish between normal movement and a dangerous fall (Thomas et al., 2016). Wearables such as Philips Lifeline Alert and the Apple Watch's Fall Detection, Medical Guardian and many more automatically detect falls and send alerts to emergency contacts and even help in understanding their daily health patterns that could inform seniors to sit when not in the best of health stats throughout the day or night, ensuring faster response times and potentially reducing injury severity.

AI modelled wearable gait analysis sensors are also being designed and developed to assess movements, balance and even walking speed with movement patterns, predicting fall risks before they occur. AI wearable working in conduction with smart homes can suggest preventative measures, assistive device interventions, home environment changes and setup according to the data generated by analysing movement patterns of users to reduce fall risks.
However, false alarms due to no accuracy and brands designing and developing gimmicky models just to earn the first mover advantages have really distracted the industry which makes it a big challenge of what

products can be trusted on to cover come the critical challenge, as many market available fall detection systems fail to differentiate between disturbed routine movements and actual falls such as sitting abruptly or bending down(Abbate et al., 2011). One of the important aspects to think and develop for the wearable fall detection AI is bridging the ability to integrate with smart home ecosystems, family circles, neighbourhoods and emergency response ecosystems. Devices like AngelSense and Walabot Home are designed to automatically trigger voice-assisted calls using artificial intelligence to emergency responders, to make sure emergency services are informed and accessed withe the seniors are not even able to access a phone but needs to be accurate and needs reduction in false alarms. However, discomfort with continuous monitoring, privacy concerns and accurate information still reduces the adoption rates for such solution with the aging population.

4.4 Considerations of Cognitive and Neurological Health powered by AI

Wearables powered by artificial intelligence are being developed to understand and analyse cognitive health, mainly for people at risk of Alzheimer's, Parkinson's disease, and other neurodegenerative disorders New age headbands are being designed and developed under that category of AI powered wearable EEG (electroencephalography), by brands such as NeuroSky and Muse, analysis and predict AI patterns to detect early and ongoing signs of memory decline, neurological decline, mental health analysis. Extremely advanced AI models recognise and run these patterns and create biomarkers to intervene at early stages of such disorders that might help in suggesting lifestyle alteration solutions to slow down disease progression. With the cases of mild cognitive impairment (MCI), AI-powered memory-assist wearables are also being designed and developed to support the growing aging population. Consumer centred products which use voice-based AI assistance such as like MemPal to help users with managing daily schedules, medication or doctors' reminders, reduces their cognitive load on keeping a track of all these aspects of survival daily.

But these devices are either not avail to the masses or do not have accurate responses.
Studies suggests that AI powered memory assistance models can provide a better approach in using these available AI models for training and helping seniors with exercises to help enhance their cognition(Yamada et al., 2024)

Despite their potential, and all the advance technology present, privacy, accuracy and availability to all still makes their adoption very limited and in most of the cases these products are designed throes the lens of lifestyle products do not validated by the medical associations also backed by a really high cost of buying for certain exclusive applications. Advance Clinical trials and proofs are still needed to get up to accuracy of these systems otherwise fit falls in the same category of so many wearables available in the market and only few provide the accurate data with brands like Whoop wearable that is enhancing as a brand and product with validations and proofs of optimised accuracy.

5. Addressing Bias and Accessibility: The Ethical implications of AI and Aging.

One of the major aspects of integrating AI into assistive devices seeking for personalisation is bias in AI-driven technologies tailored for the aging population. It is mainly concerning as we work towards at the aspects that can cater and optimise life during aging such as personalised assistive mobility, health diagnostics, empowerment through wearables and even health monitoring. Artificial Intelligence algorithmic are being updated every second and bias stems from the underrepresentation of diverse aging populations with AI datasets being trained, leading to inaccurate and under assessed and analysed health assessments and forecasting with misinterpretation of actions like movement patterns in AI-powered fall detection systems. to false alarms with wearable tech and even inaccurate health monitoring that we would start relying on keeping the senior population at the forefront of usage.

Similarly, Digital literacy and even user experience with new devices, interfaces and the ever advancing and renewing digital technology (Caliskan et al., 2017). A framework needs to be established where studies can propose an integration of Human centred AI for developers, designers, investors and even policy makers. The stakeholders need to prioritise universal data, privacy algorithms, data security and transparent regulatory compliance that should be available to all to battle the concerns with the advancement in AI for aging.

5.1 Algorithmic Bias in AI-Driven Aging Technologies

There is a need to eliminate bias in AI-driven aging technologies, designers, developers and brands must work with inclusive and representative datasets that should include and implement validated auditing techniques that identify and find differences in algorithmic decision-making. multi-generational AI testing. AI-powered healthcare tools and assistive devices risk exacerbating existing inequalities rather than enhancing accessibility for older populations without these safeguards.
There is an unusual exclusion of the older adults in AI testing phases reasons being, less participation, opposing the use of artificial knowledge that can be connect to less exposure to advance digital literacy. Many AI-based products on the whole even including mobility aids and robotic companion assistants are not tested with the older adults with disabilities reducing their effectiveness in real-world applications(Guo et al., 2020).

Similarly, voice-controlled AI assistants may perform well for younger population as they are using the technology rigorously but restrain to give reliable interactions for older individuals with cognitive impairments.

5.2 AI and Assistive Technologies creating Universal accessibility implications and the integration of empathetic AI driven design and models.

Cultural inclusivity and large language accessibility creates major implications with AI-driven aging technologies. AI-powered products lack the support of linguistic variety of a language globally with speech recognition and does not primarily support for multi-language interactions, limiting their usability for non-English-speaking older adults (J. Wang et al., 2023). To advance AI for the universal population and making it inclusive for personalisation, independence, and reducing stigma.
In addition, interfaces driven by AI designed primarily for Western markets may not accommodate the behavioural expectations, cultural preferences and even emotional connect of aging populations in other regions globally. Ensuring that AI-driven assistive technologies adhere to universal design principles and accessibility standards is essential to enabling broader adoption and equitable distribution of AI benefits after the challenges of digital literacy is solved with these high-end technological terminologies floating the industry.

Furthermore, In a study, emphasise the importance of balancing aesthetics and functionality in assistive technologies for individuals with cerebral palsy and other disabilities where universal design plays a vital role in creating products and services for a larger audience keeping empathy driven innovations at the forefront, which itself has a delusional presence when it comes to AI integrations and how artificial intelligence can connect with emotional and empathetic intelligence that hums hold and highlighting how empathetic design can enhance user acceptance and self-esteem (Oro et al., 2024).

5.3 Ethical Governance and private data for older adults.

There needs to be ethical compliances established for keeping health data secure by creating transparent data policies as the implementation and use of AI technology with seniors can exploit the data that always is under strict norms while visiting docs and clinics and the open use of AI can exploit it. Defining how exactly data can be used stored and collected is very necessary. AI-driven assistive technologies must adhere to strict privacy regulations and policies, such as GRPD and HIPAA, to ensure that health data remains at secure clouds and is only accessible to authorised validated individuals (Reddy et al., 2020).

Also enhancing the user experience with AI powered devices and applications, accessing privacy norms and understanding the transparency or their health data is essential to build trust and encourage seniors to adopt these advancing technologies.

The right to privacy becomes nuanced when we balance the two aspects of benefiting from real time monitoring and predictive healthcare with the interference in the personal lives of seniors.
Exploring the aspects of the advancing tech world provokes people for data breaches, sharing secured information to third parties and the even misusing of AI-driven health predictions compromising privacy as well as the trust needed for widespread adoption for older adults. Emphasising privacy-by-design principles and the integration of ethical AI governance frameworks, transparent data management policies, and user content control models to ensure that AI assistive technologies would live of the aging population without having concerns about security, dignity and independence.

Conclusion

This research explores AI-powered assistive technologies across multiple domains, including predictive healthcare, mobility solutions, wearable health technologies, cognitive support tools, and ethical and privacy incorporated with AI design principles but still studies and existing products and services are either gimmick of the real exploration, advancements and developments or not accessible the drawing aging population. However, thinking and exploring a framework for smart assistive products enhanced by AI is the major component in the broader explanation of ideas.

This research lays down a foundation from critically analysing what exactly is being developed creating a conceptual framework that highlights how AI can be effectively integrated into the lives of the growing senior population to address their unique needs This framework includes principles of personalisation, privacy preservation, ethical data handling, and human centric AI design to ensure that intelligent assistive products are not only functional but also trusted and widely adopted by older populations keeping various explained aspects into consideration.

Also, considering interoperability with existing systems and strategies related to help and lifestyle for reducing the digital divide that often the growing aging world.
Also, the paper talks about the ethical frameworks governed by artificial intelligence reviewing the existing market that can benefit the older population if created, deployed and tested ethically in order to keep senior independence as a major aspect yet using AI ethically and giving the correct product to senior where they can surely benefit and not think about the implications that could arise with the advancement of AI.

The paper also explores the possibilities in areas related to AI-assisted aging, such as emotional intelligence, cross-cultural inclusivity, and adaptive learning for cognitive impairments which will guide future research in the development of more inclusive and ethical AI solutions and also fuel the future designer and developers to keep these implications in mid while designing frameworks around seniors, be it input of varied language, incorporating senior thought process and even testing with them to get the optimal solutions with even the existing products in the market that are not tailored and personalised to seniors but have huge potential.

Also, analysing through the lens of an Industrial designer and a user experience expert, the advanced role of artificial intelligence in assistive technologies for older adults has huge potential but is not given so much attention, emphasising how AI-driven solutions can enhance independence and dignity with older adults. While universal design and stigma reduction are well-established in assistive technology discourse, this research extends beyond these concepts to address critical ethical considerations surrounding AI-driven assistive devices. The integration of AI into intelligent home products and health monitoring systems cannot work independently to provide solutions for the aging seniors and creating a data dump for AI to use meaninglessly. Ensuring transparent data policies, privacy-by-design frameworks, and user-controlled consent mechanisms will be essential to protecting the rights and autonomy of older adults in AI-powered ecosystems.

By addressing these gaps and emphasising varied considerations from emotional intelligence to aging in place, and from smart wearable to advancing AI with a language and ethic that the seniors believe in, this research aims to guide the responsible development and deployment of AI-powered assistive technologies, ensuring that older adults can benefit from innovation without compromising their privacy, autonomy, or

dignity while maintaining their independence.
Creating universal product frameworks and strategies will not only help seniors but also the brands and the market that would benefit from creating meaningful solutions for the aging.

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ETHICAL AND CREATIVE APPROACHES IN HEALTHCARE TECHNOLOGIES

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ABSTRACT | As digital tools, artificial intelligence (AI), and robotics become increasingly integrated into healthcare, it is essential to view them not merely in terms of their technical efficiency but as culturally and socially responsive tools that can provide new ways to enhance patient-centered care. One innovative approach is the incorporation of creativity and art-based engagement in healthcare technology, which holds unique potential for more imaginative forms of treatment. Current initiatives that demonstrate how creativity and the arts can inform healthcare technologies include socially assistive robots designed for art therapy, virtual reality (VR) interventions for post-surgery recovery, and patients' experiences with technological art as a therapeutic method, all aimed at psychological and social rehabilitation. In this paper, we explore the opportunities and challenges posed by these emerging technologies by focusing on existing innovations and using anticipatory methods to identify and assess potential future developments in this novel and exciting field. This analysis draws on insights from technology ethics and care ethics, along with considerations of public perceptions regarding such technologies. The ethical considerations addressed include risks to user privacy and autonomy, the growing need for technology to adapt to diverse socio-cultural identities among care recipients, and concerns regarding deception and emotional reciprocity in interactions with these technologies.

KEYWORDS | HEALTHCARE TECHNOLOGIES, ETHICAL IMPACTS AND RISKS, ROBOTS, ART & CARE, IMAGINING FUTURE CARE, CREATIVE EXPRESSION & IDENTITY

1. Introduction

The new ways in which creativity and art-based engagement are integrated into healthcare technologies are promising. Current efforts in this area include pilot studies and prototypes that enhance creative expression

and patients' experiences of art, thereby introducing more imaginative forms of care. These efforts encompass robotic-assisted visual art therapy, virtual and augmented reality for post-surgery pain management, and generative AI music therapy, all aimed at psychological and social rehabilitation. Before these devices fully enter healthcare systems, which is reasonably expected in the near future, it is important to consider their exciting possibilities while also addressing the potential ethical risks they may carry. To examine this emerging landscape, we use a framework informed by care ethics, which emphasizes relationality, attentiveness, and responsibility as core components of caregiving practices (Tronto, 1993; Held, 2006; Gilligan, 2014). Care ethics can guide our analysis by shifting the focus from mere technological efficiency to novel forms of treatment that rely on the inspirational potential of artistic engagement and creative expression, recognizing the relational and emotional dimensions of caregiving at the core of these practices.

Another relevant ethical framework we consider, given the evolving nature and potential role of arts and creativity in healthcare technologies, is anticipatory technology ethics. This framework employs foresight methods to anticipate the future development of certain technologies and their potential ethical and societal impacts (Brey, 2012). Such anticipatory approaches can be particularly valuable for research into emerging technologies characterized by growth and expected impact but still often regarded as risky due to the ambiguities and uncertainties surrounding them (Rotolo et al., 2015). Alongside insights based on these theoretical possibilities, this paper also takes into account public perceptions of these technologies, particularly concerns regarding excessive automation and the depersonalization often associated with AI and robotic solutions in healthcare. As with any new technologies, inherent risks are often only recognized in hindsight. Our analysis aims to anticipate these risks and discuss the ethical challenges they may present. The ethical issues we focus on include risks to user privacy and autonomy, considerations of how these technologies could potentially deceive users, their limited capacity for genuine emotional reciprocity, and how they will recognize and adapt to the diverse socio-cultural identities of patients.

2.The Emerging Creative and Arts-Based Approaches

The incorporation of creativity and arts-based engagement in healthcare technologies is an emerging practice that creates new possibilities for patient-centered care. A key element supporting this outlook is the well-established role of traditional arts-based methods in healthcare, particularly in fostering self-discovery, self-expression, and social identity (van Lith et al., 2013). On this basis, creative and arts-based interventions in technology-mediated care are expected to achieve positive outcomes, especially in psychological and social recovery. While much remains to be explored regarding the direction and full potential of these approaches, research projects and studies are already producing tangible results. One notable example is a participatory pilot study conducted at Aalborg University in Denmark, in collaboration with local Arts & Health partners, which involved joint drawing workshops with a social robot designed to support mental health (Jochum et al., 2024). The study reported positive outcomes related to participants' creative expression and social cohesion (Jochum et al., 2024). Comparable explorations into the health benefits of using robotics for the creation of art include collaborative drawing and painting workshops within the HEART project at Aalborg University (Hansen et al., 2020) and an interactive robotic art installation at the University of Canberra Hospital, both of which demonstrated improvements in health and well-being (Herath et al., 2020). Related solutions are also being developed in the realm of sound, as exemplified by projects such as an auditory environment tailored for people living with neurodivergent conditions, created by the Creative Robotics Lab at UNSW Sydney (UNSW Sydney, 2022). Another promising area is the application of virtual reality (VR), a technology rooted in interactive visual design and often classified within creative technologies, which is showing positive results, including physiological, psychological, and rehabilitative benefits (Ehioghae et al., 2024). In this realm, possibilities are sought in approaches such as therapeutic VR-based devices for the creation of art (Hacmun et al., 2018).

3.Ethical Considerations

In this section, we examine the ethical considerations and potential impacts of current and future healthcare technologies that are based on creativity and artistic approaches. While the focus is on the associated risks, we also discuss opportunities and present strategies for mitigating the identified risks.

3.1. Privacy and Data Issues

Privacy is a core human right essential for preserving our freedom, independence, and dignity. Safeguarding our privacy amid new technologies is proving to be increasingly challenging, particularly concerning personal data protection (Spiekermann, 2015). Public anxieties about data security are heightened by the risks associated with big data analytics, which aim to uncover patterns and correlations within vast datasets (Sagiroglu & Sinanc, 2013). Concerns regarding data security extend beyond big data, given cases involving data breaches and misuse, where third parties can access personal information such as medical records. These issues present significant challenges that can lead to emotional and financial harm for patients (Christl & Spiekermann, 2016). Data security issues are often discussed in hindsight, after harm has already occurred, while the lack of more robust regulations regarding how sensitive information is processed and stored remains a concern.

Such data-related challenges are relevant for future solutions in the design and use of healthcare technology. One significant technological development likely to gain momentum in future healthcare innovations is the personalization of robotics and AI systems. This personalization involves utilizing patient information—such as medical history and cognitive state—to create user profiles that allow systems to adapt their behaviors to the needs of individual users (Onder & Deniz, 2026). For example, a robot caretaker designed for older adults, drawing on user profiles, can provide tailored support by adapting to the patient's cognitive state and specific needs (Rossi et al., 2017). This development is gaining prominence in socially assistive robotics (Butler et al., 2015; di Napoli et al., 2023) and is also attracting more interest in therapeutic VR applications (Belmaqrout et al., 2023). While personalized approaches hold promise in meeting user needs, the associated risks should not be underestimated, as collected data may be prone to leaks or other breaches if there is no responsible data handling and security. This is also relevant for personalized systems in creative technology, such as AI-driven art therapy for mental health recovery, as many of the healthcare devices yet to come are likely to follow the trend of personalization. Therefore, a responsible approach to data collection and handling must be a key consideration for such devices.

3.2. Autonomy, Care Machines, and Our Freedom of Choice

The issue of patient freedom of choice is anticipated to be a relevant matter for future art-based healthcare applications. Studies on public perceptions of new healthcare technologies reveal anxiety that patients may lose control over their healthcare choices, with scenarios such as AI systems making decisions for them (Witkowski et al., 2024). Such concerns regarding some of the current technologies do not seem unjustified. While future devices intended for use in AI-driven art therapy or brain-computer interfaces for patient artistic expression may soon become more prevalent as means for psychological and social recovery, there is a risk that some of them may be designed for over-guidance or overly persuasive input, where the manipulation of patient free will may emerge as a significant concern.

In this regard, the principles of care ethics can offer guidance. This ethical framework, as articulated by Joan Tronto (1993), emphasizes that the act of caring fundamentally challenges the traditional notion of individuals as entirely autonomous or self-sufficient. Instead, Tronto advocates for viewing autonomy in care contexts as relational, underscoring the interconnectedness inherent in care relationships. This perspective can be relevant for the design of future healthcare technologies, including those that leverage creativity or art-based patient engagement. This approach is ethically sound as long as these tools facilitate decision-making in a relational manner while remaining subtle and respectful of individual preferences. Known as nudging, this form of guidance involves non-coercive suggestions aimed at fostering positive outcomes in the patient's best interests (Thaler & Sunstein, 2021). Such nudges are likely to be incorporated into many future creative healthcare solutions, ensuring that technology enhances rather than diminishes the

patient’s sense of agency and choice.

3.3. Users' Culture and Identity

There is a growing need for technologies that are not developed from a single perspective but recognize the diversity of users and the socio-cultural characteristics that shape their identities. To that end, ethical frameworks that emphasize understanding people's social and cultural contexts provide valuable insights. Joan Tronto, in her work "Moral Boundaries" (1993), suggests that good care inherently responds to the vulnerabilities and inequalities experienced by others. This perspective transcends personal realms and extends into public and political spheres, advocating for the recognition of diverse identities and needs as a matter of social justice (Held, 2006; Gilligan, 2014). In the realm of technology-based care, these principles can be leveraged to design systems that are sensitive to users' cultural backgrounds and personal identities. It is not surprising that users appreciate this aspect of technology and are more inclined to trust and accept solutions that resonate with their cultural contexts (Wang et al., 2010).

This approach holds promise for creative or art-based engagement in future healthcare technologies, given the role of the arts as powerful means for self-expression and empowerment, amplifying voices and supporting forms of expression that might otherwise be overlooked due to cultural differences or social marginalization. However, significant risks remain, as the inclusiveness of such technologies mainly depends on design choices and trends shaping the robotics industry, which may lead to failures in upholding diverse identities and instead reinforce exclusions and stereotypes. In light of these concerns, one cannot overlook how biases and discrimination embedded in new technologies are deeply reflected in various domains, including healthcare systems (Kiran et al., 2015). One critical challenge is algorithmic bias, which can lead AI systems to perpetuate stereotypes by relying on skewed data (Ferrara, 2023; Zaga et al., 2023). Consequently, care tools may unintentionally uphold harmful assumptions or fail to consider cultural sensitivities. A related issue is that many technologies are designed with dominant groups in mind, often overlooking the diverse needs of users from various backgrounds. For instance, a VR tool intended for mental health support may incorporate visuals or music that prioritize specific cultural norms, potentially alienating other users. Addressing these challenges requires thoughtful consideration during the design process to ensure that care technologies are inclusive and culturally sensitive, effectively meeting the varied needs of all users.

3.4. Realness of Experiences and the Issue of Deception

Consider a highly realistic VR environment that allows for patient expression through immersive experiences, such as the three-dimensional creation of art (Hacmun et al., 2018). These therapeutic environments can be particularly effective due to the immersion resulting from high levels of realism that many patients may find pleasant. However, such devices have the potential to deceive users by immersing them in experiences that feel authentic or emotionally impactful but lack the quality of realness inherent in actual life interactions. In particular, VR can blur the lines between reality and simulation, especially as heightened realism becomes a trend, including strategies that provide users with the sensation of inhabiting another body (Yee & Bailenson, 2007).
The deceptive potential in VR and similar technologies, like the Metaverse, raises concerns about the authenticity of interactions that occur in such healthcare applications, which is also relevant for further creative or art-based methods in this area. Perspectives in technology ethics caution that experiences with technologies, particularly care robots, may never fulfill our true needs and desires, which are inherently tied to authentic interactions found only in the real world (Sparrow & Sparrow, 2006). Conversely, some scholars argue that not all technology-mediated experiences are disconnected from reality, and that even virtual interactions can carry a significant degree of realness depending on context and actions (Brey, 2020; Coeckelbergh, 2016). Supporting arguments for such realness in VR imply that certain virtual experiences can possess an embodied quality and social aspects similar to those found in the physical world

(Coeckelbergh, 2016). Such perspectives can be important for regulatory frameworks that will guide the design of future healthcare technologies, as addressing issues of deception and realism is crucial to prevent adverse consequences and ensure that users are not misled.

3.5. Reciprocity of Emotion in Robotic/AI Care

One deceptive aspect of robots and AI in care contexts is that the emotional reciprocity these technologies provide to humans is often more automated and far from the genuine reciprocity found in human-to-human relationships. For instance, consider robots that guide patients through art-based rehabilitation, such as drawing or painting interventions aimed at psychological and social recovery. While these experiences are underway with the potential to improve patient well-being, there are occurrences generally deemed undesirable, such as patients forming emotional attachments to the robots they interact with—an outcome often reported, particularly during long-term human-robot interactions. However, machines cannot genuinely reciprocate feelings, making such human sentiments toward robots inherently one-sided (Turkle, 2007). This reflects public perceptions that machines in healthcare will only be able to offer automated types of interactions while simultaneously detracting from patients' much-needed human connections (Witkowski et al., 2024).

The concept of reciprocity in human-to-human care is explored in care ethics, emphasizing that good care relies on mutuality, responsiveness, and recognizing others as moral subjects (Tronto, 1993). Such criteria for good care, however, appear challenging for technologies like AI or robots to fulfill. While some argue that AI technologies can be viewed as relational and socially engaging, any sentiment directed toward them remains unreciprocated (van Wynsberghe, 2013, 2020). Nonetheless, scholars suggest that the lack of more genuine reciprocity in AI-driven care should not dismiss these technologies as unethical or unsuitable for future practice. One argument is that we should not idealize human care over technological alternatives, as human care often lacks deep emotional engagement due to high patient-to-carer ratios and other shortcomings associated with public health services. Another point frequently raised in discussions about the future of healthcare is that while current AI systems are limited in their capacity for reciprocity, they may be equipped with more advanced emotional capabilities as technology evolves (Coeckelbergh, 2010). The prevailing view among scholars and the public, however, is that these technologies should not replace human medical professionals in roles requiring deep engagement (Onder, 2025). Instead, they should serve as supportive tools that enhance human work in various medical settings (van Wynsberghe, 2020). These perspectives can inform the design of such technologies, including future art-based applications in healthcare.

4.Discussion

Unlike many technological solutions that often overlook human experiences, those based on creative approaches, such as creating art with robots or experiencing patient-tailored sound environments, can broaden treatment possibilities beyond mere utility and efficiency. Nonetheless, the inherent risks associated with such technologies, as discussed in this paper, are anticipated to persist, particularly those concerning user privacy, autonomy, and socio-cultural identity. Future efforts to address these risks will hinge on the development of more robust ethical and regulatory frameworks governing the responsible design and use of technology, ensuring that devices are safe and transparent, allowing people to better understand their abilities, intentions, and limitations (Wortham et al., 2017). As arts-based treatments evolve, particularly with novel creative and experiential possibilities offered by advancements that are continually emerging, ensuring emotional safety and cultural sensitivity will remain crucial.

Even risks discussed in this paper that may appear abstract and thus harder to regulate in terms of legal and ethical principles, such as machine deception and the absence of genuine emotional reciprocity in robots and AI, are expected to be subject to sharper regulation as these considerations are already addressed to some extent in ethical and regulatory frameworks regarding technology design (Boden et al., 2017). Furthermore,

as users become more tech-savvy, they will be better equipped to recognize and counteract issues like deception. It is expected that new features of such devices, such as VR or similar technologies, will allow users to gain control over the realism of these tools, enabling them to calibrate the level of deception (Slater et al., 2020). Future designs in this emerging area are anticipated to focus on addressing ethical risks while emphasizing relational and experiential aspects of care, thus fostering innovative approaches and devices that remain sensitive to users' personal spheres and contribute to improved health outcomes.

5. Conclusion

In envisioning the future of healthcare technologies, one can anticipate both the transformative potential and the inherent challenges, including those that may be specific to creativity and art-based interactions. By embracing artistic methods and ethical perspectives, we can navigate potential risks and enhance the experiences and imaginative potential that these technologies can cultivate for patients. This approach holds the promise of fostering new opportunities for more personalized and patient-centered experiences.

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Ethical Design: Auxetic Patterns and Sustainable Customization

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Abstract

This research explores the integration of ethical, sustainable, and user-centric design principles in advanced technologies. It highlights the innovative use of auxetic geometries and laser-cut patterns in garments like bras, enhancing adaptability to diverse body shapes. Through 3D software simulation, users can preview customized fits before purchasing, improving user experience and reducing returns.

This study promotes sustainability by simplifying bra sizing through the use of auxetic patterns, which help minimize excess inventory and reduce environmental impact. Thanks to the prior digital simulation, the personalization for each specific customer not only enhances the fit but also increases the durability of the garment over its lifespan, as the auxetic geometries allow the bra to adapt to the user's body changes over time.

By applying these innovations in digital ecosystems and exploring their role in shaping user-centric, sustainable products, this study contributes to discussions on the ethical dimensions of design, specifically in the context of advanced digital tools.

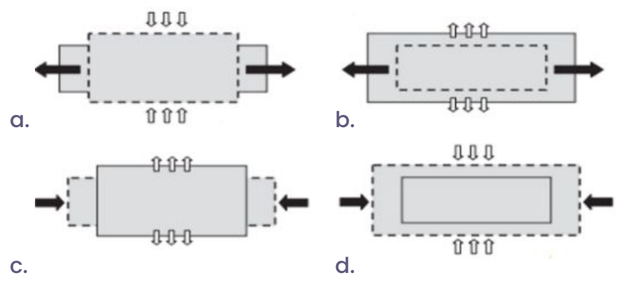

Figure 1: Fig. 1. Tensile/compressive behaviour of materials: a, c - conventional materials or fabrics; b, d - auxetic materials or fabrics.

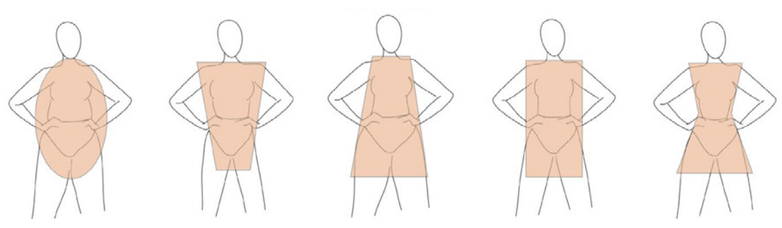

Figure 2: Shapes adaptations.

1. Research Objectives

The main objective is to demonstrate how auxetic patterns improve the adaptability of bras to diverse body shapes, allowing a single base pattern to fit multiple sizes and thus reduce the necessary stock. .

We aim to evaluate different auxetic geometries to determine which provides the best performance in terms of adaptability and comfort.

Another objective is to explore the customization of garments using these geometries as a functional design resource, leveraging digital 3D customization tools beforehand.

2. Methodology and Tools

• The research uses 3D simulations of garments with different auxetic patterns and with avatars of different sizes.

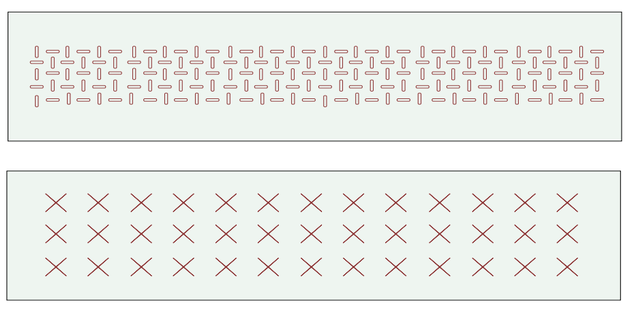

Figure 3: Auxetic geometries applied to patterns

• Physical prototypes of laser-cut patterns are made to verify the correspondence with the digital simulations.

• Clo3D design software is used for simulations, and elastic fabrics composed of 82% polyamide and 18% elastane are used.

3. Research Process

The process begins with the study of potential auxetic geometries. Two selected geometries are tested in the same position on the same fabric. Physical prototypes are created using laser-cut patterns. Finally, the results of simulations on digital avatars and tests on mannequins are compared to validate the behavior of the geometries.

Subsequently, different positions of the geometries will also be tested, and their comfort and adaptability will be evaluated.

4. Expected/Obtained Results

• It is expected to demonstrate that 3D simulations can accurately predict the behavior of auxetic geometries in physical prototypes.

• It seeks to validate that a single base pattern with auxetic geometry can adapt to multiple sizes.

• The research anticipates that the ability of 3D simulations to accurately predict the behavior of auxetic geometries will reduce pre-consumer waste, as the individual purchases a base pattern that is scanned and adapted in-store to fit their specific body. This approach eliminates the need for excessive pre-made inventory and significantly reduces stock requirements.

Figure 4: Models 1 and 2. 3D prototyping of garments with auxetic geometries. Final result on real garment. Detail of the cut of the geometries on the garment.

5. Ethical Issues in the Textile Industry

• The research addresses ethical issues such as the lack of body positivity and the tendency of brands to design only for standard bodies.

• It confronts the problems of overproduction and excessive stock, as well as the high level of pre-consumer waste of unused finished products.

• This project aims to reduce these problems by proposing a customization system that adapts to different bodies and reduces mass production.

• **This research paves the way for a transformative approach to textile design, reducing environmental impact and advocating for true inclusivity.**

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Exploring Cultural Ethical Boundaries of Generative AI in Fashion: The Participatory 'CulturalDNA Blind Test' Audit Framework

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ABSTRACT | This study proposes a "CulturalDNA-BlindTest" participatory workshop framework. Through a three - level progressive experiment, it explores the cultural and ethical boundaries of generative AI. A modular design system is constructed, with a random combination of various templates and models, making participants active reviewers of AI ethics. The experiment uses a three - party evaluation interface based on generated results and cultural prototypes, including visual and semantic matching and open - ended interpretation, to form an adversarial verification cycle. The core innovation is to couple physical interventions (cutting / pasting/drawing) with the digital regeneration process, creating a dynamic observation field for the transfer of creative rights. Through algorithm transparency adjustment experiments, it examines the impact of algorithm transparency on the accuracy of cultural attribution, the effectiveness of participatory review in revealing implicit biases in commercial AI systems, and the reinforcement of ethical awareness through tactile interaction. This framework is scheduled to be implemented at CumulusNantes2025. It is expected that the evaluation protocol can capture the cross-cultural perception mechanism in algorithmic aesthetics,

providing a mixed methodology for detecting cultural biases in generative systems.

KEYWORDS | PARTICIPATORY REVIEW, GENERATIVE AI, ALGORITHM TRANSPARENCY, CULTURAL ATTRIBUTION, TACTILE INTERACTION

Description

This experimental framework proposes a three-stage adversarial workflow to investigate the dynamic interplay between human creative agency and algorithmic cultural homogenization in fashion design systems. Structured as a 30-minute interactive workshop for 15-25 participants at CumulusNantes2025, the protocol employs a hybrid physical-digital environment where designers engage with AI systems through iterative intervention cycles.

First Phase (Generative Baseline Phase): Participants first assemble design prototypes without specific cultural inclinations using modular components (10 geometric contours + androgynous mannequin - Figure 1). Then, these prototypes will be processed through an AI pipeline that randomly combines 10 fine-tuned pre-trained models(Ma & Chung, 2024) (based on Stable diffusion - Flux) via an image-to-image generation process. Real-time metrics track the Design Intent Preservation(Li, 2024) through participants' self-assessment (using a 5-point Likert scale)(Norman, 2010). Meanwhile, an expert panel quantifies the Model Characteristic Intrusion by evaluating and comparing the output results with the characteristics of known training data.

Second Phase (Interventional Compensation Phase): A physical interference protocol is introduced - participants physically modify the basic designs through cutting, collage, or hand-drawing to introduce more subjective characteristics, compelling the AI system to reconcile these subjectively generated factors during the synthetic generation process. The evaluation part of the first phase is repeated. Quantitative analysis measures the "resistance" degree of the algorithm through the deviation of the Style Consistency Index.

Final Phase (Cultural Provenance Verification Phase): A triple-blind verification is implemented: The image-matching group matches the original output results with cultural prototypes in image form; the label-matching group matches the generated results with a cultural feature label library; the free-description group collects participants' spontaneous cultural associations with the output results. Key innovations include the adversarial loop architecture (human interference → AI regeneration → counter-intervention) and a mixed-reality verification matrix that correlates physical intervention traces with digital feature residuals.

Ethical monitoring(Memarian & Doleck, 2023) focuses on three aspects: 1) Algorithmic Suppression Rate (the frequency at which human interventions are eliminated or weakened); 2) Cultural Dominance Index (the proportion of hegemonic aesthetics); 3) Creative Agency Transfer Coefficient (the decision-making path dependence of participants across iterations).

The core advancement of this framework lies in its "Cultural DNA Decoder" mechanism - a hybrid analysis engine that combines computer vision-based pattern matching (quantifying cultural appropriation through feature similarity metrics) with natural language processing (NLP) (Wu et al., 2023) -driven semantic analysis of free-response narratives (calculating the cultural attribution dispersion through word embedding variance). By integrating manual craft processes (scissors, glue, markers) into the digital regeneration pipeline, this experiment creates a tangible observation field for tracking the transfer of creative authority.

Anticipated outcomes include a transparency gradient model that correlates algorithmic explainability with cultural attribution accuracy, and a bias detection matrix that reveals how commercial AI systems encode regional aesthetic preferences through latent space

geometries. The workshop will conclude with a tactile ethics interface where participants physically reconstruct AI outputs using mixed-media materials, leaving material traces for subsequent computational analysis of human-AI aesthetic negotiation patterns.

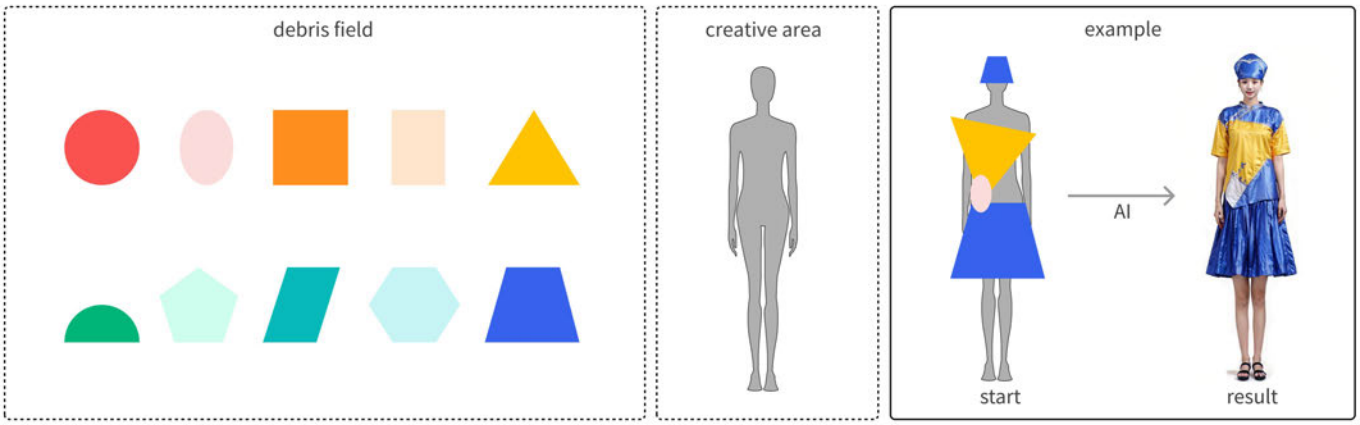

Figure 1. 10 geometric contours and androgynous mannequin, A case of a design prototype and its generation result

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From Sketches to AI: Enhancing Early-Stage Co-design with AI-Extended Visual Thinking Tools—An Empirical Research of Remote Multidisciplinary Teams

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ABSTRACT | This study investigates the impact of AI-enhanced visual thinking tools on the efficiency, creativity, and collaboration within remote, multidisciplinary teams during early-stage design phases. The research adopts a mixed-methods approach that integrates a comprehensive literature review, expert interviews, and a formal experiment. The experiment involved 28 participants from various disciplines, including 7 subject matter experts, who were recruited based on GPower analysis to ensure sufficient statistical power. A multi-phase experiment was conducted to evaluate the effectiveness of AI tools in improving collaboration efficiency, task completion times, and creative output,

while also exploring ethical considerations related to fairness and trust in decision-making processes.

To assess the effectiveness of these tools in early-stage remote multidisciplinary team collaborations, the research utilizes GPower for a one-tailed paired sample t-test power analysis. The findings indicated that with α = 0.05 and an effect size of d = 0.5, a minimum of 27 individuals was required to achieve a statistical power of 0.8. A total of 28 participants from various disciplines and 7 subject matter experts were recruited. The experimental design was refined via expert interviews to guarantee the rationality and viability of the method and theoretical framework. The participants underwent a multi-phase experiment. Data on alterations in participants' cognitive states were collected using qualitative and quantitative methods, including observation, interviews, and questionnaires. The normality of the data distribution was assessed by skewness and kurtosis values. T-tests were employed to evaluate the significance of differences in the experimental data, whereas PLS-SEM was utilised to analyse the structural interactions among variables. Triangulation analysis was employed to validate the dependability and consistency of the research findings by juxtaposing quantitative data with qualitative comments.

The findings indicate that AI tools significantly improve task completion times, increase creative output, and enhance collaboration efficiency during early-stage design tasks. However, these tools may also affect the depth of discussions and consensus-building processes, with implications for fairness and the inclusion of all team members' contributions. The study underscores the value of AI tools in enhancing the efficiency of remote team collaboration, while also emphasizing the need for careful consideration of their ethical and practical impacts in multidisciplinary settings.

KEYWORDS | AI-Enhanced Visual Thinking Tools, Co-design, Remote Team Collaboration, Initial teamwork

1. Introduction

Our society is confronted with intricate socio-technical challenges that are inherently multidisciplinary. Collaborative endeavors such as co-design, which involve participants from diverse fields, are deemed a promising approach to addressing open, complex, dynamic, and networked issues (Wang et al., 2022). Particularly in the initial stages of a project, collaboration among cross-functional teams is crucial for ensuring the comprehensive definition of the project (Yin et al., 2023). However, discrepancies in understanding the expected outcomes often lead to ineffective collaboration and wastage of resources (Senescu et al., 2013). As technology advances and project complexity grows, visualization tools like sketches and models have become increasingly recognized as vital for enhancing team collaboration and communication efficiency (Whyte et al., 2008). These tools support design thinking through graphic representation and structured thought, aiding team members in a more profound understanding and organization of information (Goldschmidt, 1994). Visual thinking, facilitated by these tools, promotes creativity, problem-solving, and knowledge construction, and effectively advances communication, decision-making, and knowledge sharing across multidisciplinary teams (Atilola et al., 2016). Recent studies have discovered that Artificial Intelligence (AI) can act as a visual stimulus, providing random and unexpected conceptual elements to spark creativity and lateral thinking (Chen et al., 2019), thus

offering possibilities for AI to enhance visual thinking tools (Sreenivasan & Suresh, 2024; Schmitt & Weiß, 2018).

This research hypothesizes that AI-augmented visual thinking tools could significantly enhance the efficiency of remote collaboration among multidisciplinary teams, especially during early-stage design phases. Although visualization tools are widely utilized in design practices, their specific impact on team dynamics and outcomes has been less explored (Mou, 2024). Consequently, this research empirically analyzes the impact of AI-enhanced visual thinking tools on collaborative efficiency, while concurrently examining their potential ethical implications in team collaboration. It aims to explore how to balance the tension between efficiency gains and ethical considerations in practical applications, providing an academic foundation and practical guidance for multidisciplinary teams to better utilize AI tools in remote collaboration.

2. Formatting rules

The proven benefits of team diversity significantly enhance the formation of innovative collaborative models, as evidenced by Rosen (2009). This advantage is particularly pronounced in the practice of design thinking, which predominantly relies on collaborative activities necessitating effective communication mechanisms and visual expressions for the co-construction of knowledge (Carlgren et al., 2016; Bresciani, 2019). This has led to the development of visual thinking as a core cognitive and communicative paradigm in design practices. Especially in the early stages of a project, team members often hold different mental models or interpretations of objectives, solutions, and processes. Ideas at this phase tend to be vague and abstract; however, visual outputs such as sketches, mock-ups, diagrams, and low-fidelity models help concretize these ideas, facilitating their discussion and manipulation in collaborative settings (Jansen et al., 2023; Yang et al., 2019; Goldschmidt, 2007).

Research indicates that the requirements for visual representation tools vary across different design stages, stemming from the dynamic evolution of task objectives, collaborative modes, and levels of information abstraction (Whyte et al., 2008). Particularly in the early stages of design, there is an emphasis on ambiguity and divergent exploration, yet this intentional maintenance of ambiguity must be delicately balanced with the clarity of information transmission. Tools should support unstructured expressions such as low-fidelity sketches and mock-ups(e.g., LEGO), employing flexible media like whiteboards and paper sketches to facilitate cross-disciplinary empathy and open-ended iteration (Jansen et al., 2023; Yang et al., 2019; Ranscombe et al., 2017). However, while deliberate ambiguity can foster divergent exploration, it may also lead to misunderstandings within multidisciplinary or cross-cultural teams (Casakin & Badke-Schaub, 2017; Nik Ahmad Ariff et al., 2012). Although previous research has achieved partial success in bridging disciplinary gaps through visual tools (Graell-Colas & Gill, 2008; Goldschmidt, 2007), effectively integrating complex information within diverse knowledge backgrounds remains a challenge, especially when addressing contextual differences and communication barriers (Casakin & Badke-Schaub, 2017).

Artificial intelligence(AI) offers new solutions by alleviating communication barriers through the standardization of conceptual exchange hubs (Marshall, 2009) and stimulating creativity with random conceptual elements as a source of visual stimulation

(Chen et al., 2019), demonstrating its potential as a tool for extending visual thinking (Sreenivasan & Suresh, 2024; Liao et al., 2020). Generative AI transforms shared visual elements through language prompts, producing diverse representations swiftly while lowering technical barriers (Verheijden & Funk, 2023; He et al., 2024), effectively balancing divergent thinking with the need for semantic convergence, and supporting equitable participation in asynchronous collaboration (Han et al., 2024; Gonzalez et al., 2024).

Although current research has made certain advancements in enhancing creativity and collaboration through artificial intelligence, significant limitations remain. Most studies focus on single disciplines or localized collaborative design scenarios (Guridi et al., 2024), with few exploring the mechanisms of collaboration within multidisciplinary remote teams and lacking a systematic framework that integrates generative AI, visual thinking, and online collaborative design. The potential value and applicability of artificial intelligence in the initial creative phases of design practice have not been fully explored (Stoimenova & Price, 2020), posing new challenges for existing models. The existing literature not only lacks a thorough analysis of potential AI ethical risks in multidisciplinary collaboration, such as algorithmic bias and power dynamics (Guridi et al., 2024), but also significant gaps remain in the integration strategies of synchronous/asynchronous tools (He et al., 2024; Shin et al., 2022), and an evaluation system that balances collaboration scaffolding with efficacy has yet to be established.

These research gaps reveal a three-tiered need: firstly, to develop cognitively adaptive and scalable collaboration systems to handle complex remote collaboration scenarios; secondly, to establish ethical safeguards throughout the multidisciplinary collaboration process; and lastly, to develop a novel evaluation framework. This framework should consider key dimensions such as role clarity of team members, the rationality of goal setting, collaborative efficacy, and AI tool adaptability. It should also empirically verify its accuracy in capturing the dynamics of collaboration and their impact on team efficacy and experience. The coordinated advancement of these dimensions will effectively address the structural contradictions between technological integration, ethical governance, and evaluative validity in current research.

3. Methodology

3.1. Research Design

This study employs a multi-stage, mixed-methods approach incorporating both qualitative and quantitative research techniques. In the first phase, a comprehensive literature review is conducted to systematically examine and analyze the current applications of artificial intelligence in cross-disciplinary design collaboration, the design field's demands for AI applications, and the potential of AI in design collaboration. The second phase involves interviews with experts and researchers from fields including artificial intelligence, experience design, cross-disciplinary collaboration, brand design, and statistics, in order to establish the influencing factors and evaluation criteria for "AI-enhanced visual assistance tools in remote team collaboration," based on the findings from the literature review (see Table 1). In the third phase, a small-scale pilot experiment is carried out to validate the feasibility of the experimental procedure and task setup. The fourth phase consists of the formal experiment, which integrates quantitative methods, surveys, and qualitative observations to provide a comprehensive assessment of the

impact of AI tools on team collaboration effectiveness.

Table 1. Dimensions of Team Collaboration Evaluation

Serial No.	Dimension	Indicator	Explanation	Sensory-Team Experience Dimension	Utility-Tool Adaptability Dimension	Collaboration-Efficiency Dimension
1	Individual Psychological Burden	Cognitive Demand	The mental and perceptual effort involved in completing a task.	✓		
		Physical Demand	The physical activity level and intensity involved in task completion.	✓		
		Time Demand	The perceived time pressure experienced during task completion.	✓		
		Workload	Perception of workload during collaborative tasks.	✓		
		Self-Efficacy	Confidence in successfully completing a task.	✓		
		Frustration	Feelings of insecurity or frustration (opposite of security or satisfaction).	✓		
2	Ease of Use	Willingness to use the tool（26）	Degree of willingness to use	✓		
		Complexity, 27	Perception of complexity	✓	✓	✓
		Convenience of use (28, 29)	Tool usability perception		✓	✓
		Functional (30)	Satisfaction with different levels of functional integration		✓	✓
		Consistency (31)	Perceived response consistency			
		Learning (32, 35)	Perception of difficulty level in	✓		✓

			learning			
		Confidence (34)	Confidence level when using tools			
		Obstacles to use (33)	Difficulties in use	✓		
3	Usefulness (Quality of Experience)	Reliability	Accurately fulfilling its functions	✓		
		Responsiveness	Quickly, efficiently, and smoothly execute tasks or provide responses		✓	
		Ensure	Give users trust and confidence in using	✓		
		Tangibles	Accurately conveying and facilitating better understanding and communication of collaborative content		✓	
		Empathy	The information provided can meet and consider the collaborative needs of users	✓	✓	
		Value	The positive impact of team collaboration or individual efficiency and experience	✓	✓	
4	Collaborative experience	reativity and flexibility	The level of creativity and flexibility in the team		✓	✓
		Ability to adjust and modify	The degree to which visualization projects can be dynamically changed		✓	✓
		Clear and guiding ability	Clarify and focus on core information and key content		✓	✓
		Integrity and wholeness	Visual cues suggest the degree to which the project has been completed		✓	✓
		Accuracy of information	The clarity of visualization results		✓	✓

		and clarity of relationships	provides quick understanding		
		Collaboration support and team experience	The degree to which visualization controls the process of group discussions	✓	✓
5	Work efficiency	Task completion time	The total time required for each part of the project from start to completion		✓
		number of iterations	The number of rounds of modifications or improvements experienced before the project reaches its final state		✓
		Design Quality Rating	Evaluation of project design quality		✓
		Outcome output	The specific amount of results generated after the completion of the project		✓
		Reaching consensus (debate+speed)	Measure the efficiency and speed at which a team achieves shared decision-making in situations of disagreement.		✓

3.2. Participants and Sampling

- Expert Interviews

To identify common pain points in remote team collaboration, recognize key factors that may affect the efficacy of AI-assisted visual tools, and gather insights on the design processes and evaluation criteria in brand upgrade tasks, the researchers, building on a literature review, developed expert interviews following the questionnaire design guidelines of Gläser and Laudel. Using a standard sampling method as outlined by Patton (2002), seven experts from relevant fields, either practitioners or researchers, were invited for semi-structured interviews. These experts were recruited through the research team's

industry and academic networks and provided informed consent prior to the interviews.

- Formal Participants in the Experiment

Based on expert interviews and the results of the pilot study, this research employed GPower to conduct a power analysis for a one-tailed paired sample t-test. The results indicated that, with $\alpha = 0.05$ and an effect size of $d = 0.5$, at least 27 participants were required to ensure a statistical power of 0.8. A total of 28 participants were recruited from various disciplines and divided into seven groups, with four participants in each group. The groups included members from the fields of design, economics, business administration, and psychology, ensuring a realistic simulation of cross-functional team collaboration. One group consisted of pilot study participants.

- Materials and Tools

This study conducts experiments on the "Boardmix" cloud collaboration platform, which integrates AI plugins (https://boardmix.cn), utilizing Tencent Meeting for video recording and remote communication, and employs "Wenjuanxing" to design post-experiment questionnaires.

3.3. Experimental Design

The experimental design adheres to the Double Diamond Model proposed by the British Design Council in 2005. In order to align with the early-stage context, the experiment primarily focuses on the first two phases: Discover and Define. These phases are further divided into four distinct components: problem identification, problem refinement, solution exploration, and solution specification. Each component is represented by an interactive area on the Boardmix platform (Figure 1), which facilitates the deepening of visual thinking and the systematic recording of experimental data.

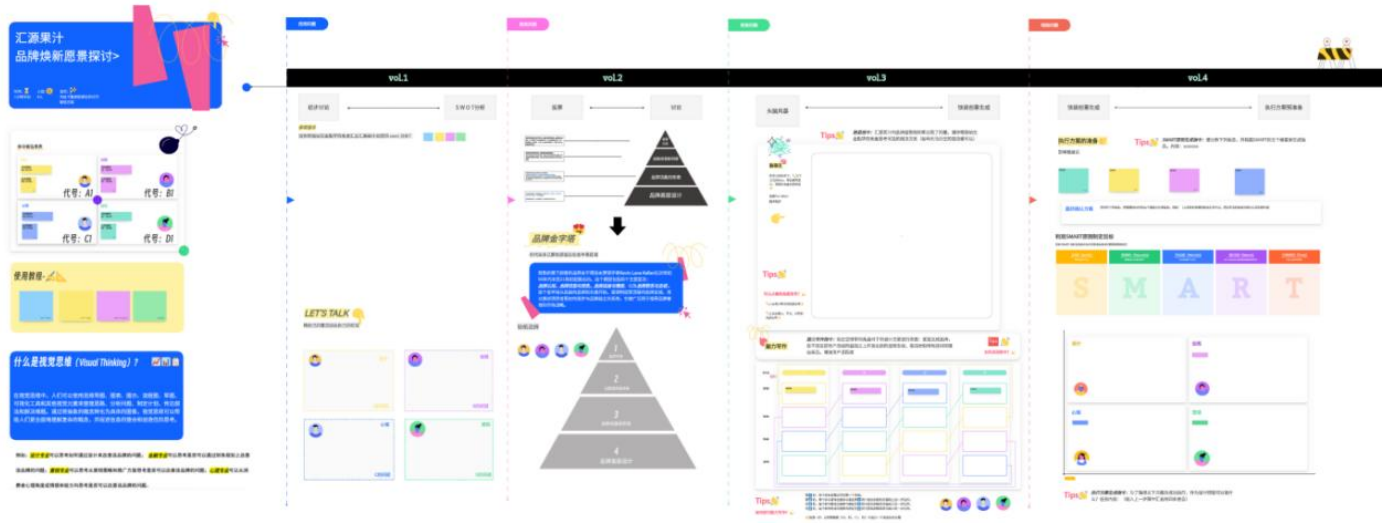

Figure 1. Interactive Area Diagram Constructed by "Boardmix"

The experimental design follows a within-subjects approach, comparing two conditions: one utilizing AI-assisted tools for design and the other relying on traditional remote collaboration methods. Each group of participants is required to complete two collaborative design tasks: one

using only the traditional visual thinking tools provided by the online collaboration platform, such as sketches, drawings, models, and stickers (referencing Eppler & Burkhard, 2007; Gonçalves et al., 2014), and the other incorporating AI-supported visual thinking tools in addition to the traditional ones. To mitigate learning effects, each group performs two distinct but similar tasks on the same collaborative platform. To counterbalance order effects, the experimental sequence (1. No AI – AI; 2. AI – No AI) is randomly assigned across six experimental groups, ensuring that the effectiveness of AI tools in multidisciplinary remote collaboration is not influenced by the sequence of tasks. Upon starting, participants engage in online discussions to share experiences and observations, followed by approximately ten minutes of divergent discussion.

To enhance the academic rigor and practical relevance of the study, a series of structured action plans were employed, and functional interactive panels were created for each testing phase within the Boardmix platform. These panels provided spaces for participants to post their ideas. Before each task, the researchers introduced a fictitious brand facing developmental challenges and needing a brand revitalization. Participants were then provided with relevant information and used sticky notes representing their roles to add ideas to the corresponding interactive panels. In the event of disagreements during group discussions, consensus was reached through anonymous voting. Upon completion of both rounds of testing, two comprehensive brand strategy proposals were produced, one of which was collaboratively developed with the assistance of AI tools.

The researchers (moderators) recorded the entire testing process using mobile devices and screen recording tools. Each session lasted approximately 30 to 50 minutes. To ensure participants clearly understood the task flow and relevant information, detailed instructions were provided before each session and task. At the end of the test, participants completed a questionnaire consisting of 35 questions, enabling the researchers to gather precise and detailed feedback.

3.4. Data Collection

Data collection is divided into two parts. The first part involves the experimental data obtained through the researchers' observations and records during the experimental process. The second part consists of quantitative data collected via questionnaires completed by participants after each experiment.

- Experimental Data

The experimental data primarily comprises records made by the researchers during the experiment and is further validated through a review of these records post-experiment. The key variables assessed include:

1. Task Completion Time: In the context of collaboration, task completion time is a crucial indicator for assessing the effectiveness of tools (Dennis & Valacich, 1999). Accordingly, the researchers recorded the total time taken by each test group to

complete each segment of the task, from initiation to completion.

2. Design Quality Assessment: The quality metrics of the final output, both with and without the use of AI tools, are reflected through internal team voting. An output is considered high-quality when it receives approval from more than half of the team.

$$\text{Calculation Method: } \frac{\text{The number of outputs recognized by three or more individuals}}{\text{Total output in this phase}} \text{ X 100\%}$$

3. Output of Results: Through internal team voting, we assess the creativity metrics of team collaboration when using AI tools versus when not using them. (Outputs are considered valid if they receive approval from half or more of the team and are recorded as potential alternatives.)

$$\text{Calculation Method: } \frac{\text{The number of outputs recognized by two or more individuals}}{\text{Total output in this phase}} \text{ X 100\%}$$

4. Participation: This data primarily evaluates whether the contributions among participants within each test group are balanced.

$$\text{Calculation Method: } \text{Var(E)} = \frac{1}{\text{N}} \sum_{\text{i=1}}^{\text{N}} (\backslash engagement_i - average\ engagement,))^2$$

N:Number of group members $\backslash engagement_i$: the engagement of the i-th member; $\frac{\mathbf{1}}{\mathbf{N}}$: $average\ engagement$

Total group engagement = 1 - Variance of engagement

5. Number of iterations: In design or creative tasks, the number of iterations is often regarded as an indicator of the depth of the team's creative process, reflection, and revision. Both excessively high and low iteration counts can signal distinct issues in collaboration, such as excessive repetition or insufficient in-depth discussion. It refers to the number of modifications or improvements a project undergoes before reaching its final state.
6. Consistency: In design or creative tasks, the number of iterations is commonly seen as a measure of the depth of the team's creative process, reflection, and refinement. A high or low iteration count may indicate underlying problems in collaboration, such as over-iteration or a lack of substantial dialogue. This refers to the number of rounds of revisions or improvements a project undergoes before its completion.

$$\text{Calculation Method: } K = \frac{P - P_e}{1 - P_e}$$

P: The proportion of the same level selected by multiple evaluators.

P_e: The expected consistency derived from the probability of each level being selected.

7. Reaching Consensus: Researchers determine whether the use of AI tools facilitates faster and more efficient collaboration by observing and recording the communication time and task completion time among participants during the experiment. This helps to assess whether AI tools reduce unnecessary communication costs and enhance overall team performance.
8. Topic Relevance: The proportion of content in the generated ideas that is highly related to the topic, compared to the overall output.

$$\text{Calculation Method: } \frac{\text{Content with high relevance}}{\text{The total output generated in this phase}} \text{ X 100\%}_{\text{。}}$$

3.5. Questionnaire Data

In addition to the experimental record data, the researchers utilized a questionnaire to document each participant's subjective perceptions following each task, in order to assess the AI tool's impact on 'collaboration-efficiency,' 'sensory-teamwork experience,' and 'utility-tool adaptability.' The evaluation employed a 5-point Likert scale, ranging from 1 = 'Strongly Disagree' to 5 = 'Strongly Agree.' The questionnaire items were derived from the SUS, NASA-TLX, and SERVQUAL frameworks, and were subsequently modified by the researchers to suit the specific needs of the experiment.

4. Conclusion

4.1. Experimental Data Conclusion

To streamline the experiment description, the experimental rounds using traditional tools will be collectively referred to as Round A, and those using AI tools will be collectively referred to as Round B.

- Problem Identification: SWOT Analysis

An analysis of task completion times reveals that the Round B experimental group significantly reduced task completion times during this phase. This improvement can be attributed to the AI tools, which, by providing rapid data retrieval and automated analysis, helped the team minimize manual effort, thereby accelerating task completion. In terms of output, as depicted in Figure X, the Round B group produced significantly more content than the Round A group. However, the quality of their output was only marginally better than that of the Round A group, and the output conversion rate was notably lower. This suggests that while AI tools facilitate the rapid generation of vast amounts of information during the problem identification phase, much of the content lacks practical utility. At this stage, the team must invest time in evaluating and filtering this content. Furthermore, although the Round A group demonstrated slightly higher engagement than the Round B group, the difference was minimal, and observational data indicated that participants in both rounds exhibited high levels of engagement. Thus, at this stage, the use of traditional tools versus AI tools does not appear to significantly impact team member participation.

Step 1		SWOT Analysis								
Round	Group	Task Completion Time	Design Quality Evaluation	Output	Participation calculation					
					P1	P2	P3	P4	Variance	Participation
A	Pilot	23m 21s	4/34	26/34	9	12	7	6	0.0045	0.9955
	G1	22m 37s	7/29	24/29	7	10	6	6	0.0032	0.9968
	G2	20m 49s	10/28	18/28	10	4	3	11	0.0159	0.9841
	G3	24m 6s	6/54	34/54	12	19	10	13	0.0039	0.9961
	G4	24m 38s	6/39	25/39	11	8	6	14	0.0060	0.9940
	G5	21m 37s	5/29	23/29	7	10	5	7	0.0038	0.9962
	G6	20m 59s	4/34	22/34	6	10	13	5	0.0089	0.9911
Group Average		**22m 35s**	**42/247 (17%)**	**172/247 (69.64)**					**0.0066**	**0.9934**
B	Pilot	16m 46s	9/48	31/48	19	10	9	10	0.0072	0.9928
	G1	17m 56s	13/75	54/75	34	14	14	13	0.0138	0.9862
	G2	10m 17s	18/53	26/53	9	21	14	9	0.0086	0.9914
	G3	24m 42s	2/39	20/39	7	13	9	10	0.0031	0.9969
	G4	18m 33s	4/53	16/53	15	6	12	20	0.0091	0.9909
	G5	17m 32s	10/47	28/47	12	18	9	8	0.0069	0.9931
	G6	19m 47s	8/41	23/41	10	9	14	8	0.0031	0.9969
Group Average		**17m 56s**	**64/356 (17.98%)**	**198/356 (55.62)**					**0.0074**	**0.9926**
A VS B		***A>B***	***A<B***	***A>B***					***A<B***	***A>B***

Figure 2. Data illustration from the SWOT analysis phase.

- Focused Issue: Brand Pyramid

In terms of iteration frequency, the B-round experimental group experienced significantly fewer modification and refinement cycles during task completion compared to the A-round experimental group. Additionally, the average time spent reaching a consensus in the B-round group was slightly shorter than that of the A-round group. This phenomenon may be attributed to the assistance provided by AI tools, which accelerated the consensus-building process. Furthermore, the Fleiss's Kappa coefficient for the B-round group was significantly higher than that of the A-round group, indicating a greater level of inter-member agreement during the evaluation phase within teams using AI tools. This outcome likely results from the higher standardization of the results provided by AI tools, which reduces divergence among team members during the evaluation process, thereby enhancing collaboration efficiency. In contrast, teams using traditional tools may experience greater evaluation biases due to differences in subjective opinions and interpretations, leading to more pronounced disagreements and necessitating additional time for coordination and correction.

Step 2		Brand Pyramid							
Round	Group	number of iterations	consistency						Consensus Achievement
			Category Counts				Internal Consistency	Expected Consistency	Fleiss's Kappa coefficient	
A	Pilot	0	0	3	1	0	0.5			N/A
	G1	2	0	2	2	0	0.333			9m 38s
	G2	1	0	2	2	0	0.333			5m 2s
	G3	1	0	2	2	0	0.333			5m 13s
	G4	1	0	2	0	2	0.333			3m 28s
	G5	1	0	2	2	0	0.333			4m 58s
	G6	0	0	4	0	0	1			N/A
Group Average		6/7					0.4524	0.4770	-0.0470	5m 40s (5/7)
B	Pilot	0	0	2	2	0	0.333			4m 53s
	G1	0	0	0	4	0	1			N/A
	G2	0	0	2	2	0	0.333			3m 41s
	G3	1	0	4	0	0	1			N/A
	G4	0	0	4	0	0	1			N/A
	G5	0	0	2	1	1	0.1667			6m 36s
	G6	1	0	0	4	0	1			N/A
Group Average		2/7					0.6905	0.4669	0.4195	5m 3s (3/7)
A VS B		*A>B*					*A<B*	*A>B*	*A<B*	*A>B*

Figure 3. Data Illustration from the Focused Issue Analysis Phase

- Finding Solutions: Brainstorming and Mind writing

In the brainstorming phase of this stage, the B round experimental group outperformed the A round experimental group overall. Firstly, the average task completion time of the B round group was lower than that of the A round group. Moreover, the B round group not only produced more content but also demonstrated a higher conversion rate of results and higher-quality output compared to the A round group. Additionally, the relevance of the topics produced by the B round group was superior. This may be attributed to the experimental group using traditional tools, which placed excessive emphasis on creativity and divergent thinking during the process, causing some of the outputs to deviate from the original design objectives. Therefore, using AI tools to assist the team in problem-solving not only facilitates the rapid generation of large volumes of high-quality, effective solutions, but also ensures that the output remains closely aligned with the task objectives. Furthermore, the participation results indicate that the use of AI tools did not affect the level of engagement among team members. On the contrary, the B round group exhibited higher engagement levels compared to the group using traditional tools.

Additionally, the lower variance in the B round group suggests that AI tools may have helped reduce the dominance of individual members, thus mitigating issues of unfairness and avoiding decision centralization within the team. Consequently, AI tools may contribute to improving collaboration efficiency and fostering more balanced teamwork.

Step 3		**Brainstorming**									
Round	**Group**	**Task Completion Time**	**Topic Relevance**	**Design Quality Evaluation**	**Output**	**Participation calculation**					
						P1	P2	P3	P4	**Variance**	**Participation**
A	**Pilot**	17m 11s	7/17	2/17	10/17	4	4	6	3	0.0041	0.9959
	G1	18m 58s	5/12	1/12	4/12	4	3	2	3	0.0035	0.9965
	G2	11m 31s	6/17	5/17	7/17	4	3	2	8	0.0319	0.9681
	G3	20m 43s	11/26	2/26	12/26	4	8	8	6	0.0041	0.9959
	G4	16m 13s	15/28	2/28	18/28	4	6	6	12	0.0115	0.9885
	G5	14m 52s	10/18	1/18	13/18	5	5	5	3	0.0023	0.9977
	G6	22m 42s	12/22	3/22	20/22	2	6	5	9	0.0129	0.9871
Group Average		**17m 27s**	**66/140 (47.14%)**	**16/140 (11.43%)**	**84/140 (60%)**					**0.0100**	**0.9900**
B	**Pilot**	15m 52s	14/25	3/25	19/25	7	7	8	3	0.0059	0.9941
	G1	16m 39s	17/27	3/27	22/27	8	4	8	7	0.0037	0.9963
	G2	12m 16s	13/22	4/21	13/21	5	5	5	6	0.0004	0.9996
	G3	20m 9s	18/27	4/27	17/27	6	6	8	7	0.0009	0.9991
	G4	13m 42s	20/32	3/32	16/32	9	5	5	13	0.0136	0.9864
	G5	13m 27s	18/28	4/28	25/28	8	7	7	6	0.0006	0.9994
	G6	18m 33s	13/24	2/24	20/24	5	6	6	7	0.0009	0.9991
Group Average		**15m 48s**	**113/185 (61.08%)**	**23/185 (12.43%)**	**132/185 (71.35%)**					**0.0037**	**0.9963**
A VS B		***A>B***	***A<B***	***A<B***	***A<B***					***A>B***	***A<B***

Figure 4. Data Illustration for the Finding Solution Phase

In the mindwriting phase, similar to the brainstorming phase, despite a slightly longer consensus-building time for the B round experimental group compared to the A round group, the B round group demonstrated a significant efficiency advantage in overall task completion time. Notably, although the B round group saved time, their evaluation consistency was marginally lower than that of the A round group. This phenomenon likely arises from the rapid speed of creativity generation facilitated by AI tools, which prevented in-depth discussions. Additionally, the lower consistency in the B round group may indicate that AI tools, to some extent, could lead to decision biases, thereby influencing the fairness of the decision-making process. Hence, while AI tools significantly enhanced collaboration efficiency in this stage, they did not appear to significantly improve the depth of collaboration or consensus. At the same time, despite accelerating the decision-making process, AI tools may not have ensured equal consideration of all team members' opinions or equal influence in the decision-making, though this was not observed in this experiment.

Across both phases of this stage, AI tools positively impacted the overall task completion

time, significantly reducing the average duration. However, the effect of AI tools on internal team decision fairness showed divergent results, likely linked to the differing nature of the tasks and the varying interactive demands of each phase. In the brainstorming phase, where every member quickly accessed a wealth of information, AI tools played a crucial role in fostering information sharing and ensuring equal participation. This mechanism facilitated broader involvement among team members, effectively reducing the centralization of decision-making and occurrences of unfairness. In the mindwriting phase, however, the task requirements did not necessitate the rapid generation of large quantities of content, which led to AI tools focusing more on accelerating task completion, at the expense of deep discussion and the opportunity to thoroughly evaluate each idea. Consequently, team members, influenced by the rapid pace of decision-making, may not have fully discussed the ideas, thereby affecting the fairness and consistency of decisions.

Step 4		**Mind writing**								
Round	**Group**	**Task Completion Time**	**number of iterations**	**Evaluate consistency**						**Consensus Achievement**
				Category Counts				**Internal Consistency**	**Expected Consistency**	**Fleiss's Kappa coefficient**	
A	**Pilot**	22m 31s	1	0	2	2	0	0.333			3m 23s
	G1	16m 4s	0	0	0	4	0	1			N/A
	G2	23m 48s	1	0	2	0	2	0.333			2m 58s
	G3	15m 1s	0	0	3	1	0	0.5			N/A
	G4	16m 47s	0	0	0	4	0	1			N/A
	G5	18m 43s	0	0	1	3	0	0.5			N/A
	G6	18m 58s	0	0	0	4	0	1			N/A
Group Average		**18m 50s**	**2/7**					**0.6667**	**0.5000**	**0.3333**	**3m 11s**
B	**Pilot**	15m 3s	0	0	1	3	0	0.5	**Expected Consistency**	**Fleiss's Kappa coefficient**	N/A
	G1	14m 48s	0	0	3	0	1	0.5			N/A
	G2	15m 23s	0	0	0	0	4	1			N/A
	G3	16m 18s	1	0	2	2	0	0.333			3m 55s
	G4	11m 15s	0	0	0	4	0	1			N/A
	G5	13m 23s	0	0	1	3	0	0.5			N/A
	G6	16m 33s	1	0	2	1	1	0.1667			3m 10s
Group Average		**14m 40s**	**2/7**					**0.5714**	**0.3642**	**0.3258**	**3m33s**
A VS B		***A>B***	***A=B***	***A>B***				***A>B***	***A>B***	***A>B***	***A<B***

Figure 5. Data Illustration for the Finding Solution Phase

- Clear Solution: The Five SMART Principles

At this stage, the performance of the B-round experimental group was significantly faster

than that of the A-round group, with AI tools markedly reducing task completion time. However, despite the B-round group's output being considerably higher than the A-round group, the quality of their results did not show a significant advantage over the A-round group. In fact, their conversion rate of results was slightly lower. This indicates that while AI tools facilitated the rapid generation of a large volume of results, and even allowed for the production of more high-quality outcomes, their impact was limited. In terms of engagement, the B-round group displayed lower levels of involvement, which could be attributed to the introduction of AI tools and varying familiarity with their usage, leading to inconsistencies in team members' performance. Consequently, AI tools may not have significantly enhanced the engagement of team members at this stage, and the differing levels of familiarity with these tools might have also affected the fairness of decision-making.

Step 5		**Using the SMART principle to set goals**								
Round	**Group**	**Task Completion Time**	**Design Quality Evaluation**	**Output**	**Participation calculation**					
					P1	P2	P3	P4	**Variance**	**Participation**
A	**Pilot**	30m 14s	2/14	10/14	3	4	4	3	0.0013	0.9987
	G1	27m 8s	3/17	11/17	4	3	6	4	0.0041	0.9959
	G2	41m 56s	2/12	10/12	3	3	2	4	0.0035	0.9965
	G3	31m10s	1/13	6/13	3	4	5	1	0.0129	0.9871
	G4	26m21s	2/17	10/17	5	4	3	5	0.0024	0.9976
	G5	29m 18s	1/15	13/15	3	3	4	5	0.0031	0.9969
	G6	33m 31s	3/18	13/18	5	2	5	6	0.0069	0.9931
Group Average		**31m 23s**	**14/106 (13.21%)**	**73/106 (68.87%)**					**0.0049**	**0.9951**
B	**Pilot**	28m 22s	3/23	19/23	5	8	8	2	0.0117	0.9883
	G1	29m 48s	3/22	12/22	6	6	5	5	0.0005	0.9995
	G2	31m 8s	6/15	8/15	4	4	3	4	0.0008	0.9992
	G3	29m 47s	2/25	13/25	6	6	6	7	0.0003	0.9997
	G4	23m 29s	4/33	21/33	7	5	5	16	0.0190	0.9810
	G5	26m 40s	4/29	20/29	9	10	6	4	0.0068	0.9932
	G6	29m 12s	3/24	22/24	7	7	6	4	0.0026	0.9974
Group Average		**28m 21s**	**25/171 (14.62%)**	**115/171 (67.26%)**					**0.0060**	**0.9940**
A VS B		***A>B***	***A<B***	***A>B***					***A<B***	***A>B***

Figure 6. Data Illustration for the Clear Solution Phase

4.2. Conclusion of Questionnaire Data

- Section 1: Evaluation of Collaborative Efficiency in AI-Extended Visual Thinking Tools

The results from the questionnaire in this section indicate that, in terms of overall output (8) and individual output (7.75), the B group in Round B outperformed the A group (7.19 and 6.5) in collaborative efficiency. This suggests that AI tools have a distinct advantage in enhancing both team and individual efficiency, with a slight reduction in repetitive tasks (A: 6.63/B: 6.75). Additionally, AI tools more effectively support team collaboration. However, the A group in Round A scored higher in facilitating quicker consensus within the team (8.19) compared to the B group (7.25), implying that while AI tools may accelerate efficiency, they may also compromise the depth of decision-making and the speed at which consensus is reached. Moreover, both tools showed similar effects in reducing conflicts (A: 6.69/B: 6.81), indicating that AI tools may prioritize expediting task progress over fostering in-depth discussions and ensuring equal participation among all team members, potentially affecting the fairness of team decisions. Therefore, while AI tools may enhance efficiency, they may fail to balance the expression of opinions among all members, resulting in some voices being marginalized.

Table 2. Section 1 Questionnaire Results & Issues

Question	A-round experimental group questionnaire results	B-round experimental group questionnaire results
In the process of using this collaborative tool, conventional/AI-Extended visual thinking methods have enhanced the overall productivity of the team.	7.19	8
In the process of using this collaborative tool, conventional/AI-Extended visual thinking methods have improved individual productivity.	6.5	7.75
In the process of using this collaborative tool, conventional/AI-Extended visual thinking methods have reduced the frequency of rework by individuals.	6.63	6.75
In the process of using this collaborative tool, conventional/AI-Extended visual thinking methods have satisfied all collaborative needs.	5.75	6.63
In the process of using this collaborative tool, conventional/AI-Extended visual thinking methods have enabled the team to reach consensus more rapidly in the project.	8.19	7.25
In the process of using this collaborative tool, conventional/AI-Extended visual thinking methods have reduced the number of discussions (or disputes) within the team during the project.	6.69	6.81

- Section 2: Evaluation of Collaborative Experience in AI-Extended Visual Thinking Tools

In the evaluation of collaborative experience, the B group in Round B scored higher than the A group across several indicators. The B group rated higher in information accuracy and clarity of relationships (A: 7.19/B: 7.56), indicating that AI tools contribute to improved understanding of

information within the team. Additionally, the tools reduced the cognitive load (A: 7.63/B: 5.38) and time demands (A: 5.19/B: 3.44) for participants during task execution, enabling team members to complete tasks more efficiently. Furthermore, AI tools were found to effectively increase members' confidence (A: 7.44/B: 7.69) and reduce feelings of frustration (A: 3.88/B: 3.31). However, AI tools may have limited the creative expression of team members in certain aspects (A: 7/B: 6.75). This suggests that while AI tools reduce pressure on team members, they may simultaneously suppress creativity.

Table 3. Section 2 Questionnaire Results & Issues

Question	A-round experimental group questionnaire results	B-round experimental group questionnaire results
When using predefined charts within conventional/AI collaboration tools with team members, how do you think it affects the team's creativity and flexibility?	7	6.75
When using predefined charts within conventional/AI collaboration tools with team members, how do you think it impacts the team's ability to adjust and modify content to meet specific needs?	7.25	7.19
When using predefined charts within conventional/AI collaboration tools with team members, do you believe it helps clarify and direct the team's attention to key information and critical points?	7.5	7.5
When using predefined charts within conventional/AI collaboration tools with team members, do you think it enhances the team's perception of the overall coherence and integrity of the information?	7.94	8.13
When using predefined charts within conventional/AI collaboration tools with team members, do you feel it improves the team's understanding of the accuracy of information and the clarity of relationships?	7.19	7.56
When using predefined charts within conventional/AI collaboration tools with team members, do you think it provides better collaborative support and a more effective team experience?	7.63	7.31
When using predefined charts within conventional/AI collaboration tools with team members, do you think the visual appeal enhances engagement and participation in the collaboration?	7.44	7.25
Cognitive Demand: When performing this task using conventional/AI collaboration tools, how mentally and cognitively demanding do you find it? (e.g., thinking, decision-making, calculation, memory retrieval, research, etc.)	7.63	5.38
Physical Demand: When performing this task using	6.19	4.44

conventional/AI collaboration tools, how physically demanding do you find it? (e.g., information input, communication, note-taking, etc.)		
Time Demand: When performing this task using conventional/AI collaboration tools, how much time pressure do you feel? (e.g., how do you feel under time constraints, such as completing a task in 10 minutes that typically requires 10 minutes?)	5.19	3.44
Workload: When performing this task using conventional/AI collaboration tools, how much effort do you think is needed to maintain a standard level of performance?	5.94	4.25
Self-Efficacy: When performing this task using conventional/AI collaboration tools, how confident are you in your ability to successfully complete the task? (Imagine playing a game you are highly skilled at—how confident are you in your ability to successfully complete a level?)	7.44	7.69
Frustration: When collaborating using conventional/AI collaboration tools, do you experience feelings of insecurity or frustration (opposite feelings being security or satisfaction)? How do you feel when striving to complete a task but being unable to succeed despite your efforts?	3.88	3.31

- Section 3: Evaluation of Tool Adaptability for AI-Extended Visual Thinking Tools

In the tool adaptability section, the B-round experimental group outperformed in responsiveness (A: 7.06/B: 7.38) and usability (A: 6.38/B: 7.56), while also scoring higher in reducing the need for technical support (A: 4/B: 3.13) and learning curve (A: 7.63/B: 7.88). This indicates that AI tools can execute tasks more efficiently and smoothly, making them more accessible to cross-disciplinary collaborators. Additionally, the B-round group demonstrated better performance in functional integration (A: 7.19/B: 7.5) and response consistency (A: 3.69/B: 3.25), suggesting superior coordination among multiple functions and consistency in task responses. However, the A-round experimental group excelled in reliability (A: 7.69/B: 7.06), tangibility (A: 7.94/B: 7.38), and trust in the tool (A: 6.19/B: 6.5), reflecting the traditional tools' advantages in stability, interface intuitiveness, and greater trust from team members. Moreover, AI tools show a higher dependency and lack of transparency in data security. Overall, while AI tools demonstrate significant advantages in adaptability and efficiency, challenges remain in reliability and trust. Furthermore, although AI tools lower technical barriers, concerns over trust and privacy may affect the fairness of cross-disciplinary collaboration.

Table 4. Section 3 Questionnaire Results & Issues

Question	A-round experimental group questionnaire results	B-round experimental group questionnaire results

Reliability — The conventional/AI collaboration tool consistently and accurately performs its functions.	7.69	7.06
Responsiveness — When used simultaneously by multiple individuals, the conventional/AI collaboration tool executes tasks or provides responses swiftly, efficiently, and seamlessly.	7.06	7.38
Assurance — The conventional/AI collaboration tool instills trust and confidence in users through a high-quality experience (e.g., users trust the information provided by the tool and are assured that data is secure).	6.5	6.19
Tangibles — The icons, symbols, and other elements within the conventional/AI collaboration tool are intuitively designed, clearly conveying their function and enhancing the understanding and communication of collaborative content.	7.94	7.38
Empathy — The conventional/AI collaboration tool offers information that meets and considers the collaborative needs of users, fostering stronger connections within teams.	7.75	7.56
Value — The conventional/AI collaboration tool positively impacts team collaboration or individual efficiency and experience.	8	7.44
I foresee frequent use of the conventional/AI collaboration tool during team collaborations.	7	7.19
I have observed that using the conventional/AI collaboration tool in collaborative tasks can introduce unnecessary complexity.	3.44	3
I believe the conventional/AI collaboration tool is user-friendly during collaborative tasks.	6.38	7.56
I feel that technical support is required to use the conventional/AI collaboration tool.	4	3.13
I find that the various functions of the conventional/AI collaboration tool are well-integrated, fulfilling my diverse needs.	7.19	7.5
I think the responsiveness of the conventional/AI collaboration tool exhibits significant inconsistencies.	3.69	3.25
I believe most people will quickly learn how to use the conventional/AI collaboration tool.	7.63	7.88
I find the conventional/AI collaboration tool to be quite cumbersome to use.	3	2.25
I have complete confidence in using the conventional/AI collaboration tool.	7.94	7.69
Before using the conventional/AI collaboration tool, I	2.94	2.69

need to learn a substantial amount.

5. Discussion

In this study, the researchers conducted empirical analyses (design experiments and surveys) to explore the impact of AIGC tools on cross-disciplinary remote collaboration during the early design stages. They assessed the tools across three dimensions: collaboration efficiency, collaboration experience, and tool adaptability. The study revealed the potential of these tools to enhance team efficiency, creativity, and collaboration depth, while also highlighting the challenge of balancing the efficiency benefits of the tools with concerns regarding trust and fairness in team collaboration. The key contributions of this research include:

- Application of AI Tools in Multidisciplinary Remote Collaboration

Through experimental data analysis, the study demonstrated how AI tools enhance team creativity, efficiency, and collaboration during the solution-finding phase (such as brainstorming and creative writing). AI tools not only help reduce task completion time but also influence team members' engagement and creative efficiency in generating ideas and integrating solutions.

- Impact of AI Tools on Team Collaboration

Although AI tools significantly improve task execution efficiency and reduce workload in most areas, the research data reveals limitations in promoting in-depth discussions and team consensus. This finding helps to understand the role of AI tools in accelerating the decision-making process and their potential impact on the depth and consistency of team decisions.

- Evaluation of Tool Adaptability by Team Members

Survey results from the experiment revealed that AI tools excel in enhancing responsiveness, usability, and functional integration, while also pointing out the shortcomings of AI tools in reliability and trust, particularly in cross-disciplinary collaboration. These insights guide future research directions.

- Ethical Implications

Based on data analysis, the study identified potential issues related to equal participation and trust within team collaboration. AI tools may lead to uneven member participation, accelerated decision-making that affects discussion depth, and concerns over data privacy and security. These findings provide practical and ethical guidance for the design and application of AI tools.

- Limitations

Although this study is based on an empirical design experiment, it lacks more reliable validation and evaluation processes. Additionally, due to the limited sample size, the

study did not encompass a broader range of participants. Therefore, future work should expand the sample size to include more cross-disciplinary collaborators, ensuring the generalizability of the research findings.

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FUTURE FICTIONS: YOUNG DESIGNERS AND THE ROLE OF GENERATIVE AI IN WORLDS BUILDING

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ABSTRACT | This article explores imaginaries of the future expressed by young designers using generative AI and traditional methods. It examines a design fiction workshop with 900 design students in France, where participants developed future scenarios over a three-week period. The workshop focused on climate trajectories and human activities such as mobility, housing, food, clothing, healthcare, entertainment, education, information, communication, and goods delivery. The students worked in 170 multi-level groups, each dedicated to a specific human activity, and created their deliverables, an A3 poster with a single image and a one-page text, while adhering to constraints of specific societal models, climate scenarios (+1.5°C to +3°C), and biodiversity conditions.

The article analyzes this diverse corpus by focusing on the representations of humans and technical systems within the designs. A framework was developed to categorize the students' work based on six key dimensions: The presence of humans and technical systems, the orientation of the world (utopia vs. dystopia), the intention of the project (problem-solving vs. question-framing), the scale of change (individual/behavioral, collective/organizational, systemic/structural), and the principal levers of change (technical, legislative, societal choice). This framework enables first, to question the representations produced by design students in a design fiction exercise (A3 posters) and second, to examine how the tools used in building these outcomes influence these representations, particularly regarding the growing use of generative AI.
Furthermore, the article extends the reflection on the ethical implications of generative AI in design which was mainly used by students in this project. We thus considered it relevant to study whether this medium impacted their projects. It raises concerns about

the potential for AI to take over the imaginative process, given that these tools come with inherent biases that could lead to the production of uniform objects and stereotypes disconnected from cultural and social contexts. Rather than taking a purely distrustful view of AI, the article advocates for proactive education in AI usage, encouraging designers to engage with these biases in a critical and responsible manner. The goal is to foster a practice of "designing consciously," where designers understand the limitations of generative AI and learn to integrate its outputs into creative processes without losing sight of the broader social and ethical responsibilities that come with shaping future scenarios.

KEYWORDS | DESIGN FICTION, DESIGN REPRESENTATIONS, FUTURE, FORESIGHT, GENERATIVE IA, REPRESENTATION TOOLS

1. Introduction

Thinking about the future can often evoke a sense of vertigo - a destabilizing and uncomfortable experience, as Grimaux and Wacquez (2023) describe. Yet, envisioning, embodying, and questioning possible futures is an essential exercise, despite its complexity. In this direction, design plays a critical role: it allows for the manipulation of complex material by crafting specific representations that shape how ideas are presented, debated, and perceived. In the context of foresight through design fiction, it is essential to recognize that the tools used are not neutral. This article has two objectives: first, to question the representations produced by design students in a design fiction exercise (A3 posters) and second, to examine how the tools used in building these outcomes influence these representations, particularly regarding the growing use of generative AI. Indeed, these generative tools induce specific visual ways of representing, thereby influencing the perception and discussions around the futures they depict (Masure, 2023). Therefore, this article extends the reflection on the ethical implications of using generative AI, by initiating a discussion on the designers' awareness towards the integration of these technologies into their practices. It questions how the representation of futures may involve “transferring” some of the imaginative process to these tools, despite their inherent biases. It highlights the risk of producing uniform objects and stereotypes, which would lack evocative power, nuance in representation, and be disconnected from social and cultural contexts.

The article begins by reviewing the existing literature on design fiction, focusing on the impact of tools in shaping representations in design practices. It then introduces the research context and methodology through a detailed case study, examining how 900 design students produced 170 visual representations of the future in the context of a design fiction project, with some using generative AI. Finally, the discussion explores the ethical implications of these technologies, emphasizing the importance of fostering critical awareness and responsibility among designers.

2. State-of-the-art / context

The literature review explores two interconnected dimensions critical to the study of future representations in design. First, it delves into design fiction and foresight, emphasizing speculative practices that use narrative and prototyping to envision and critique alternative futures. Second, it examines the impact of representation tools on the design process, highlighting how these tools shape creative outputs and influence designers’ thinking.

2.1 Critical approaches in design and essential criteria for effective implementations

Foresight methodologies have historically aimed to broaden the scope of strategic thinking, moving beyond linear extrapolations of the past. Gaston Berger, one of the pioneers of foresight, emphasized the importance of considering human aspirations and ethical reflection when imagining the future (Berger & al., 1959). Design fiction is a speculative practice that uses fictional narratives and prototypes to explore alternative futures. It exists at the intersection of design, science fiction, and foresight. Building on the speculative approach proposed by Dunne & Raby (2013, 2024) and drawing from the work of Bleecker (2009) and Sterling (2013), who argue that design requires a 'speculative turn,' Hales (2013) presents Design Fictions as a "cluster of problems," creating "a discursive space within which new forms of cultural artefacts (futures) might emerge."

Through the creation of "diegetic prototypes" (Kirby, 2010; Sterling, 2013)—artefacts that can build entire worlds while leaving room for the viewer's imagination—designers craft objects and narratives that embody imagined futures. These prototypes invite participants to engage with hypothetical scenarios in a tangible, experiential way, allowing them to explore and reflect on possible futures through these objects. Following the speculative turn, design also requires an "experiential turn," which bridges the gap between abstract future possibilities and life as it is directly experienced in the present. As Candy (2016) suggests, "bridging the 'experiential gulf'" involves cultivating the skills and sensibilities necessary for futurists to engage with the experiential aspect of design fiction. This approach seeks to integrate cultural, social, and political dimensions into projections, recognizing the inherently performative power of these representations in shaping present-day decisions (Kinsley, 2010). And this experiential gulf is related to the medium in which these fictions are represented, so that their audiences can interact with them effectively. Indeed, one of the key contributions of design fiction is its ability to shift participants from passive observers to active agents in shaping the future. Stuart Candy and Jake Dunagan (2016) emphasize the importance of making futures tangible and experiential, engaging participants on sensory, emotional, and intellectual levels through different formats: from an artefact or instantiation (the stuff) to a visitable representation of time and place (the situation), then through a scenario - a specific future history or state to the setting of the experience. This approach transforms speculative scenarios into lived experiences, fostering empathy and deeper understanding.

As mentioned earlier, design fiction extends its roots from speculative design. The value of foresight lies in its exploratory nature, where fiction becomes a tool to navigate ambiguity and challenge entrenched assumptions. As Dunne and Raby (2007) note, "this shift from thinking about applications to implications creates a need for new design roles, contexts, and methods. It's not only about designing." This highlights the need for designers to reflect not only on the artifacts they create but also on the ethical and political implications of these creations, questioning who decides, on whose behalf, and to what end these futures are imagined. This reflexivity aligns with the idea that futures are not fixed destinations, but rather capabilities—spaces for ongoing ethical and creative negotiation. In educational contexts, design fiction and speculative design have been particularly effective in equipping young future designers with the tools to navigate uncertainty and complexity. By creating immersive prototypes and engaging narratives, students learn to question assumptions, explore alternative trajectories, and critically evaluate the implications of their work. These practices encourage a form of anticipatory literacy, where designers not only imagine futures but also critically interrogate the processes and tools used to shape them. As Helgason et al. (2021) highlight, speculative design in education has moved beyond its early function of provoking internal debates, to a more outward looking role of facilitating urgent discussions about the central role design plays in shaping our collective futures and society as a whole. One of the most striking themes that emerged was the clearly articulated desire to implement

transformation and to create impact on the world through action. Speculative design has matured beyond its early focus on internal debates, now playing a critical role in facilitating urgent discussions about design's influence on society and our collective futures, with an emphasis on creating responsible, transformative, and just change. However, for such critical practices to be effective, the question arises: through what mediums are these futures represented, and how do these representations shape their impact?

2.2 The invisible hand of design tools: how representation shapes imagination

Design tools play a central role in shaping the creative process, influencing not only the final output but also the ideas that underpin the design. Design representations has continuously evolved, adapting to new technological paradigms that challenge traditional notions of authenticity, authorship, and perception. Walter Benjamin (1936) provides a foundational framework for understanding the impact of reproduction technologies on artistic and design practices. His concept of the "aura," referring to the unique presence and authenticity of an artwork tied to its historical and cultural context, remains highly relevant in contemporary design analysis. Today, as AI-generated imagery becomes an integral part of creative workflows, new analytical filters emerge to interpret the transformation of design outcomes. Benjamin argued that mechanical reproduction erodes the aura of an artwork by detaching it from its original, unique existence. In the realm of visual mediums of representations of design fictions, traditional design techniques (hand drawings) once carried the mark of manual craftsmanship, embodying a distinct aura. However, digital tools (2D and 3D digital design) and mostly and more recently, generative AI are redefining design productions.

As Morelli and Tollestrup (2007) note, within the established paradigm of product design, designers have a well-defined understanding of what to communicate, to whom, and when during the process. However, tools that mediate representation, such as digital design tools, can alter the course of design thinking itself. Oxman (2006) citing Mitchell (2005) highlights the transition from paper-based drawings to digital tools in architecture, where digital models enable a more nuanced response to contextual factors such as site, program, and expressive intention. This shift, described as “digitally mediated design” brings about a complexity that expands the designer's ability to conceptualize and materialize their ideas. Further on Oxman (2006) underscores how digital tools bridge the gap between design and materialization, even in the conceptual stages, offering new depths of contextualization and performative design. These tools, which include everything from CAD software to virtual reality environments, enable designers to test and visualize concepts in ways that were once impossible. Also Norman & Verganti (2014) suggest that radical product innovation is driven by either advances in technology or a deliberate change in the meaning of the product, “the introduction of a new technology that provided new affordances to the designers or to a new meaning assigned to the product and its uses, allowing for radical changes using existing technologies”. However, they also limit the designer’s thinking by privileging certain aesthetic or functional possibilities, thus framing the outcome in ways that are often constrained by the tool’s affordances (Norman & Verganti, 2014).

Representations in design are more than simple visual artifacts; they are mediators that influence how ideas are communicated and understood. Wright & Cairns (2011) and Kinsley (2010) argue that representations are not neutral—they serve as key agents in the design process by translating abstract ideas into tangible outputs. Furthermore,

representations are performative, creating a space of anticipation in which the boundaries of what is imagined and how futures are framed are defined (Zamenopoulos & Axeliou, 2020). Tools like sketching, prototyping, and digital modeling shape this anticipatory space, influencing how design is conceptualized and experienced. Bodker (2009) offers an insightful perspective on the role of representations in design, emphasizing their function as both externalizations of ideas and collaborative tools that facilitate communication among designers and stakeholders. Representations, whether formal or informal, act as containers for ideas, helping to externalize concepts that are yet to be fully realized. They not only help designers hold onto their ideas but also serve as a medium through which those ideas can be shared, critiqued, and refined. Bodker (2009) states that design representations serve a dual purpose: they both reflect aspects of the future application and act as affordances (Norman, 1991) that shape the design process. Unlike goal-oriented design methods that define the product upfront, representations in design evolve and resist predetermined paths.

In the case of generative AI, tools that automate part of the creative process raise new challenges. Masure (2023) notes that while these tools can standardize design outcomes, they also bring the risk of diminishing the designer's control over the creative intent. As AI introduces new visual vocabularies and modes of representation, it simultaneously raises questions about the implications of standardization versus innovation, and whether these tools might inadvertently perpetuate biases, disconnecting designs from the social and cultural contexts in which they exist. In design education, the influence of tools is particularly pronounced. Students are trained to think through the capabilities of their tools, which ultimately shapes how they approach problems, envision solutions, and consider the future. The performative and experiential nature of prototypes, including dioramas or interactive installations, helps foster a richer, more immersive design process (Candy & Dunagan, 2016). As Masure (2017) argues, our world is "modeled" by the tools we use, but to truly understand it, we must also "deform" it, as Jerome J. McGann suggests. Masure emphasizes that the digital transformation of knowledge must manifest in changes of form to bring contemporary realities into consciousness. This requires bridging the concerns of the "old" humanities—ambiguity, variation, subjectivity—with the modes of digital thought, including simulation, modularity, automation, variability, and transcodification. By doing so, we can uncover the latent possibilities often overshadowed by the noise of technological "innovations" in new media.

In this context, the integration of generative AI and other advanced design tools offers both significant opportunities and challenges, expanding the ways in which young designers can engage with the world-building process. However, there is a lack of research focusing on how the usage of generative AI in design education is influencing the learning process and creative development. Early works, such as Yadav (2024), show that "*generative AI technology may be used to imagine design in a number of ways, including producing resources for image design, creating pictures with certain styles, and realizing image style conversion.*" AI-generated art, while offering new creative processes, provides fresh tools and inspiration for designers. However, as Yadav highlights, the rise of AI in design also introduces potential issues, such as copyright conflicts and privacy concerns. "*The use of AI in the big data age may potentially result in copyright conflicts, raising concerns about the privacy protection of users and customers*." The study calls for well-defined legal limits to protect both users' and customers' rights. These challenges, however, are accompanied by opportunities to enhance the effectiveness and quality of image processing and design. With the increasing range of applications for AI generation platforms, it becomes essential to carry out theoretical research grounded in artistic practice to guide the appropriate use of AI technology, while also addressing its potential drawbacks and limitations.

The question then arises: does AI-generated design lack aura, or does it cultivate a new form of digital authenticity? Some other questions may follow: are AI-assisted works evoke emotional or intellectual responses differently compared to manually designed productions? Not all of these questions will be answered in this paper. However, a first discussion will be proposed to contribute to them.

3. Research context, corpus and methodology

The corpus of student projects analyzed in this study originates from a partnership with a consultancy firm specializing in guiding organizations toward decarbonization, climate adaptation, and biodiversity restoration. The overarching objective of the project is to develop quantified foresight scenarios to help businesses anticipate the strategic transformations necessary for long-term viability.
In the first phase of the project, four distinct future narratives (N1, N2, N3, N4) were co-developed through collaborative design workshops with experts from the involved companies. Each narrative represents a different societal model, structured around four key value dimensions: social structure, perception of time, relationship with nature and technological development. These narratives outline four distinct future scenarios, each shaped by different guiding values:

- N1: Humans prioritize collective well-being, acknowledge their interdependence with other living beings, and adopt a long-term perspective in alignment with biological cycles. While they are not opposed to technology, its role is strictly utilitarian, minimizing its use whenever possible.
- N2: There is strong awareness that humans are part of a broader ecosystem that must be protected. Consequently, technology is leveraged to improve collective living, automate certain tasks, and allow people to live in harmony with natural cycles.
- N3: While there is a desire to protect nature, it is still primarily seen as a resource. Individual freedom is prioritized, and technology is perceived not as an end in itself but as a means to enhance personal performance, happiness, and hyper-personalized experiences.
- N4: Nature is viewed purely as a resource serving individual aspirations. Speed and performance are highly valued, and technological development is seen as a tool for eliminating constraints and accelerating access to desires.

3.1 Design Fiction Workshop and Corpus

The design fiction workshop, which serves as the foundation of this study, involved 900 design students in France over a three-week period. The goal was to develop speculative future scenarios addressing climate trajectories and human activities such as mobility, housing, food, clothing, healthcare, entertainment, education, communication, and goods delivery. Each student group was assigned a specific set of constraints, including:

- One of the four future narratives (N1, N2, N3, or N4).
- A climate trajectory (+1.5°C, +2°C, or +3°C).
- A biodiversity condition (endangered, stabilizing, or regenerating).
- A specific human activity (e.g., mobility, housing, healthcare).

The objective was to produce a design fiction scenario envisioning a unique future for the year 2060. Each scenario was presented in a standardized format: a single A3 poster featuring one image and an accompanying text. The final corpus consists of 170 projects (each comprising one image and one text), distributed relatively evenly across the four narratives and the various human activities.

3.2 Framework for Analysis

Our analysis was motivated by the initial observation of the widespread adoption of generative AI in student projects. The detailed analysis of this corpus focuses on how students represent humans and technical systems within their speculative futures. To structure it, we developed a framework that examines six dimensions:

1. Representation of humans
2. Representation of technical systems
3. Orientation of the world: Utopian vs. dystopian futures.
4. Project intention: Problem-solving vs. question-framing.
5. Scale of change: Individual/behavioral, collective/organizational, or systemic/structural.
6. Means of change: Technological, legislative (imposed regulations), or societal (driven by collective choices).

4. Research questions

During the presentation of the posters produced by the students, we realized that a significant majority had chosen to use generative AI to depict their design fiction scenarios. Out of 170 projects, 97 were created using this technology, representing 57%, compared to 38% that used digital tools and only 5% that relied on more traditional representation methods, which we have categorized as manual tools (including drawing, collage, photography, or physical modeling). It is difficult to fully understand why such a large proportion of students opted for generative AI, especially in a school where hand sketching is widely integrated into the various methodological phases of the design process.

Indeed, AI enables the rapid generation of images, likely making it an appealing tool for both idea generation and formalization. The images produced tend to be visually striking and captivating, often creating an immediate "wow" effect due to the wide range of styles and creative possibilities they offer. This inevitably influences the creative process, potentially altering or at least transforming the way students construct their concepts and scenarios: do they start with an image and then build their story around it, or do they begin with a narrative and use AI to illustrate it? A parallel concern, as raised by Masure (2023), is the bias introduced by the use of generative AI, regardless of the specific tool employed. If all students use the same technologies, does this risk leading to a standardization of visual outputs, contradicting the very essence of design, which values grounded choices and unique creative perspectives? Could this result in an aesthetic homogenization and a loss of graphic diversity? What connections did students establish between design fiction and artificial intelligence? How do these new tools shape the way they conceptualize and represent their scenarios? More broadly, can design fiction reinvent itself through these technologies?

As Masure (2017) notes, over the past thirty years, the way design work is approached has been profoundly influenced by the introduction of software tools that automate many tasks previously inherent to the design process. These tools increasingly frame creation as a set of problems to be solved by software, a perspective now shared by many designers. Thus, does the use of AI significantly impact the content and representations produced? Do these tools shape future imaginaries by limiting certain representations while favoring others? To what extent do they influence not only the aesthetics of the outcomes but also the concepts and worldviews that emerge from them? These questions open up new avenues for reflection, both for design education and for the

evolution of design fiction as a distinct field within design. In the following sections, we will analyze the various dimensions presented in our analytical framework by comparing the use of different representation techniques and their specific impact on each aspect.

5. Results and discussion

The results highlight key patterns, such as the anthropocentric and technological driven future and a tendency towards problem-solving despite demand for systemic change. Each of these themes is explored in depth to understand several implications of the tools used and first assumptions on how they shape the students' perspectives on the future.

5.1 An Anthropocentric View of the Future

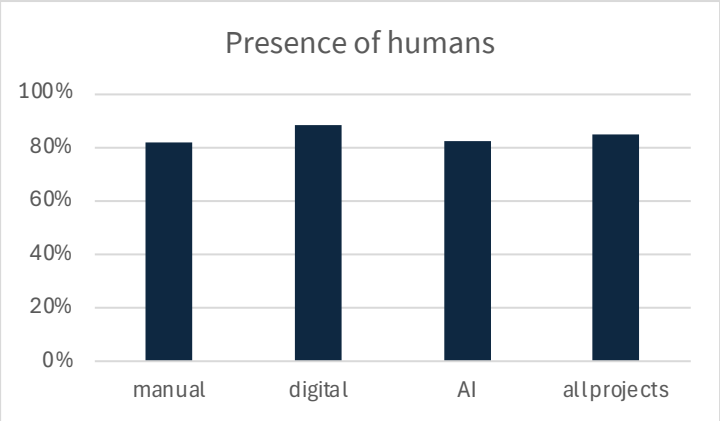

Figure 1: Proportional comparison of presence of humans

Humans are significantly more represented than other living beings, appearing in 85% of projects, compared to 49% for plants and only 14% for animals. This leads to an initial observation: contrary to the idea that generative AI might dehumanize creative outputs, its use does not reduce the presence of humans in the produced images. On the contrary, human figures are slightly more represented in projects using digital tools than in those created with traditional techniques or generative AI. These findings invite us to reconsider the relationship between technology, imagination, and representations of living beings in design fiction. Rather than fading in favor of a fully automated imaginary, human figures remain a central element in the creative work of young designers. This aligns with the fundamental definition of design, which is inherently grounded in human experience. However, a more critical perspective reveals that this large representation of humans reflects an anthropocentric imaginary, where other species and natural resources - often grouped under the term "nature" - are primarily depicted as mere resources for sustaining human life and, at times, ensuring human comfort. This tendency is even more pronounced in projects that used AI, as those following N4 trajectory, which featured the most humans, were also based on the most pessimistic climate and biodiversity scenario.

5.2 The Persistent Hyper-Presence of Technical Systems

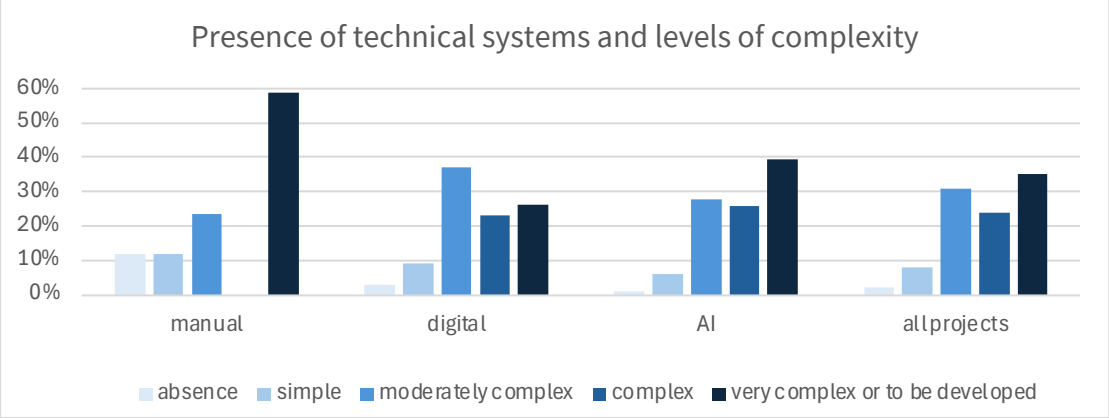

Figure 2: Proportional comparison of presence of the different levels of technical systems

Technical systems are overwhelmingly present in the projects, appearing in 98% of them. Figure 2 shows how the presence of technology is found in each representation category. These systems can be categorized into five levels of complexity:

- Absence, no technical system represented or suggested: 2%
- Simple, primarily manual or mechanical: 8%
- Moderate, involving automation or renewable energy: 31%
- Complex, incorporating robotics and/or AI: 24%
- Very complex, depicting speculative future technologies: 35%

At the scale of the entire corpus, this result raises questions about the level of trust the younger generation places in technology to address uncertainties and ensure humanity's survival—sometimes even enhancing human comfort. Interestingly, there is no clear correlation between the use of AI-generated images and the projects that depict highly complex or futuristic technologies. On the contrary, projects using traditional manual techniques tend to envision more radical technological shifts. These alternative futures often portray significant departures from current lifestyles, though not necessarily in a more sustainable direction. Could this suggest that designers find greater creative freedom in traditional techniques, allowing them to imagine what does not yet exist? Perhaps hand-drawing, collage, or physical modeling enable a more radical form of speculation.

This would align with Norman & Verganti's (2014) theory of radical innovation, which requires a complete reframing of existing paradigms—something generative AI may struggle to achieve, as it relies on pre-existing image datasets. Additionally, the need to articulate ideas through written prompts in AI tools might encourage a more predefined and structured vision. In contrast, manual techniques offer greater flexibility for metaphorical and suggestive representation rather than direct illustration or literal figuration.

5.3 Dystopia as a Catalyst for Radical Change

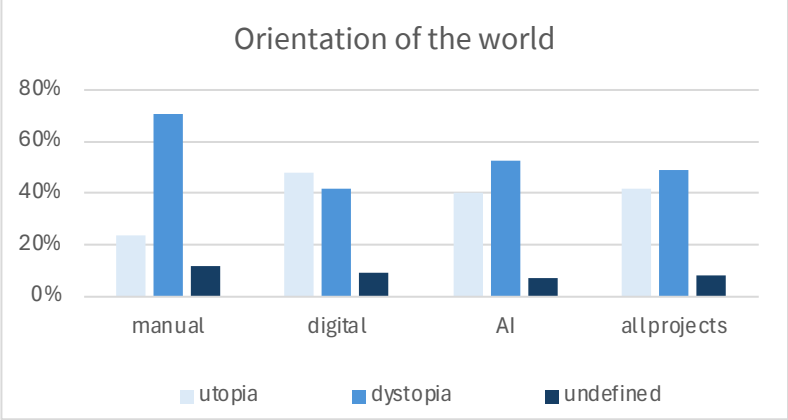

Figure 3: Proportional comparison of the nature of the projected world

Overall, the projects are nearly evenly split between utopian (42%) and dystopian (49%) contexts of the builded worlds, with a small proportion (8%) remaining neutral. However, when analyzing this distribution based on representation techniques, slight variations emerge. The proportion of dystopian worlds increases among projects using AI-generated imagery (52.6%) and even more significantly in those employing manual techniques (70.6%). Additionally, manually created projects exhibit a slightly higher share of neutral scenarios. This suggests that the choice of representation technique reflects a particular stance. Whether used to frame a solutionist response by highlighting the role of design through contrast, or to provoke debate about undesirable futures, dystopian narratives prove to be a powerful tool, especially in projects using manual techniques. Once again, could the act of drawing by hand allow for a freer, more radical exploration of dystopian themes, one that elicits stronger emotional engagement?
The distribution across different narrative frameworks does not reveal significant differences. However, dystopian scenarios are more prominent in narratives N3 and N4, which emphasize individual agency over collective well-being. In these narratives, nature is largely perceived as a resource for sustaining human life, sometimes with an awareness of the need for its protection, but often as a mere backdrop to human survival.

5.4 Problem-Solving as a Designer's Reflex

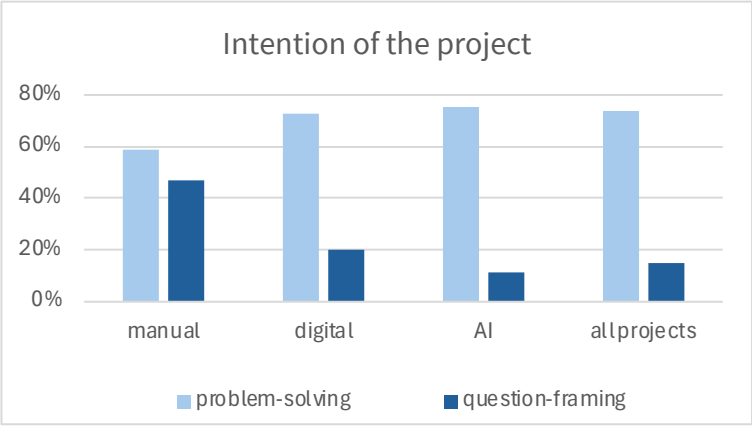

Figure 4: Proportional comparison of the intention of the project

This category reveals the most significant variation between two approaches: three-quarters of the projects present a solution to a given problem. When examining how different representation techniques were used, we observe similar proportions of solution-oriented projects among those employing digital tools and AI. However, projects

using manual techniques show a greater tendency toward question-framing rather than direct problem-solving. Once again, this raises the question of the creative freedom allowed by manual representation techniques. While design fiction is a powerful tool meant to provoke debate, the ingrained habit of young designers to respond to a given issue with a problem-solving approach has largely taken precedence.
When analyzing this trend across different narrative frameworks, we notice that projects based on N1 and N2, whose value systems diverge more significantly from contemporary lived realities, tend to favor question-framing (See tables 1 to 4 in appendices). These narratives emphasize three fundamental values that contrast with the forces driving humanity into the Anthropocene: prioritizing the collective over the individual, valuing deceleration over acceleration, and recognizing human interdependence with ecosystems to maintain harmony. Could it be that questioning desirable futures is more effective when starting from what does not yet exist?

5.5 Systemic Change as a Desirable Horizon

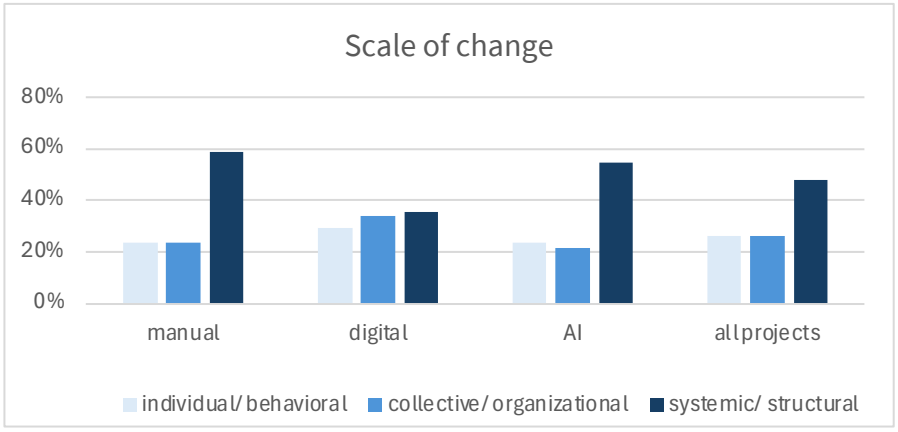

Figure 5: Proportional comparison of the scale of change

Half of the projects address structural and systemic changes in society and lifestyle (48%), highlighting profound transformations in cultural norms and practices. The remaining half is evenly divided between projects focusing on individual behavioral changes and those centered on organizational-level shifts. This overall trend appears similar in projects using manual techniques and AI, with a slight increase in the proportion of projects tackling systemic change. However, projects describing change at the organizational or individual scale are more prevalent among those using digital tools. Once again, this raises questions about the ability to project into distant futures or to adopt unconventional perspectives- especially for young designers accustomed to designing use-case scenarios on an individual or small collective scale. Are digital tools less conducive to imagining radically different futures?
Given that these tools are widely used in student project presentations, we can question their effectiveness as tools for speculative thinking. As observed with manual techniques, which sometimes allow for questioning the radicality of necessary change, digital tools may instead reinforce conventional approaches. Indeed, projects depicting large-scale changes, shifts in systems, cultures, or worldviews, which are inherently more abstract, are proportionally more frequent in projects using manual techniques.

5.6 Technical Levers as a Driving Force for Change

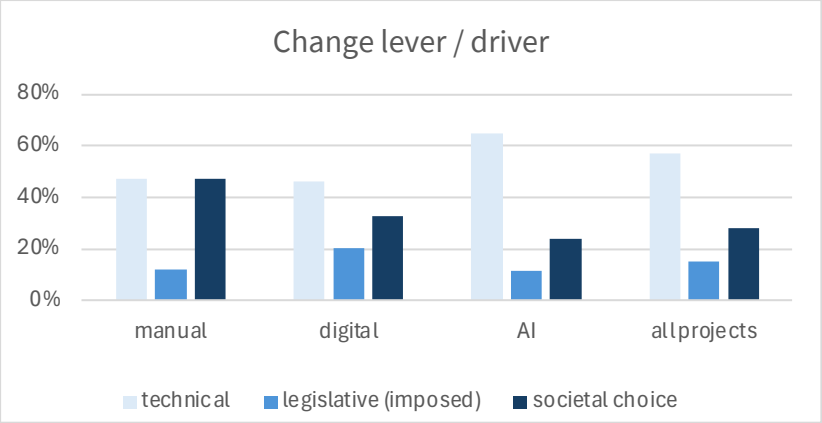

Figure 6: Proportional comparison of the principal driver of the change

Most scenarios depict futures where change is primarily driven by a technological lever. While this reflects a certain optimism regarding the ability of humans to transform their way of life by choice rather than obligation, it also raises questions about the dominant role given to technical solutions as the primary catalyst for transformation. Notably, the proportion of projects emphasizing technology as a key driver of change is higher in those using AI compared to projects employing other techniques, where no significant difference is observed on this category of levers.
However, projects influenced by Narrative N1 stand out from this overall trend (see tables 1 to 4 in appendices). In these scenarios, change is often portrayed as a social choice stemming from a collective awareness of human interdependence with the living world. Interestingly, the use of AI did not diminish the prevalence of such scenarios compared to other techniques. More broadly, AI does not appear to shape the underlying values of the scenarios. Instead, the opposite trend emerges: AI serves as a representational tool that reinforces the narrative's initial values, particularly when those values emphasize technological change as the primary enabler of transformation.

6. Conclusion and further discussion

The overall results of this study raise important questions about how young designers project the world, particularly as the scenarios explore futures shaped by technology, climate change, and other profound social mutations.
Most projects reflect a technosolutionist mindset that continues to dominate imaginaries. Even if scenarios depict lifestyles vastly different from today, they consistently feature technological mediation, increasingly complex systems, and sometimes even technological levers as drivers of systemic change. Indeed, many of the projects remained problem-solving despite inspiration and methodological guidelines from the field of speculative design given to students. In order to deconstruct these imaginaries, the design fiction approach can help shift perspectives, challenge assumptions, and open up possibilities that move away from the solutionist approach that has become almost automatic in design practice. However, this requires more practice! By incorporating more design fiction and a foresight approach into design education, regardless of specialization, we can stimulate a broader debate about the futures we collectively want to build while fostering reflection on the ethics of the profession.

Reflecting on the representation techniques and the influence of generative AI, this area

also needs more maturity. With this analysis, it is difficult to definitively state the specific role of generative AI in reinforcing anthropocentric visions of the future, where humans remain central to the visual narrative, sometimes at the expense of other forms of life or alternative environments. At the same time, it is unclear whether these tools enable the exploration of new narratives, reaffirming humanity's place in an uncertain future.
As Masure (2017) states, "design is the receptacle of new techniques, but it also works to divert them from linear logics of productivity and profitability to make something else of them." Promoting hybrid approaches — positioning AI as one tool among many rather than an exclusive solution — and encouraging experimentation with both the tools themselves and the representations they produce should not exempt us from questioning the use of these tools within the design curriculum. It is still essential to teach students and young designers to understand the proper use of these new tools, while also raising awareness of broader ethical concerns, including intellectual property and algorithmic influence (Masure, 2017). Following the philosophy of Bernard Stiegler (2004), who critiques the "symbolic poverty" produced by overused technologies, designers should be encouraged to rethink the industry and consider a "re-enchantment of the world" through their practice (Stiegler, 2006). Looking at the current moment, we notice a notable appetite for the use of AI among students, possibly driven by generational factors or an attraction to new technologies. However, this usage does not seem to significantly impact the direction of the projects created. Yet, if we take an optimistic view, there is a slight tendency to associate manual techniques with a greater sense of freedom and radicality. This is an aspect worth exploring further in future research to confirm.

As a perspective, we would like to engage the discussion on ethics in the use of AI. It is not enough to simply master its functioning and prevent biases related to its programming and learning processes. We must also question why we need it (or not). Integrating this question into design education should be preceded by an ethical positioning regarding the industry for which we are preparing students. Given the speed with which these tools can impact the ways we think and act, the time for debate and critical reflection on technology is crucial. Without it, we risk training a new generation of designers who will simply integrate AI modules or assistive devices with the goal of driving innovation, while ignoring their negative impact.

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Appendices

Table 1 - Global trends : All representation techniques

		N1	N2	N3	N4	All projects
Presence of humans		79%	88%	86%	86%	85%
Presence of technical systems and level of complexity	absence	2%	-	1%	-	2%
	simple	5%	1%	2%	1%	8%
	moderately complex	8%	11%	7%	5%	31%
	complex	3%	8%	5%	7%	24%
	very complex or to be developed	8%	5%	10%	12%	35%
Orientation of the world	utopia	17,6%	12,9%	9,4%	2,4%	42%
	dystopia	5,3%	9,4%	12,9%	21,8%	49%
	undefined	2,4%	2,9%	2,4%	0,6%	8%
Intention of the project	problem-solving	22,9%	20,6%	14,1%	15,9%	74%
	question-framing	4,1%	5,9%	2,9%	1,8%	15%
Scale of change	individual/ behavioral	5%	6%	8%	6%	26%
	collective/ organizational	8%	11%	4%	4%	26%
	systemic/ structural	12%	8%	13%	14%	48%
Change lever/driver	technical	9%	14%	15%	19%	57%
	legislative (imposed)	4%	6%	3%	2%	15%
	societal choice	12%	6%	6%	4%	28%

Table 2 - Projects distribution by representation technique: manual (5% of all projects)

		N1	N2	N3	N4	all projects (5%)
presence of humans		0,6% (11,8%)	-	1,2% (23,5%)	1,2% (23,5%)	4% (82%)
presence of technical systems and level of complexity	absence	0,6% (11,8%)	-	-	-	0,6% (11,8%)
	simple	-	-	0,6% (11,8%)	-	0,6% (11,8%)
	moderately complex	0,6% (11,8%)	-	0,6% (11,8%)	-	1,2% (23,5%)
	complex	-	-	-	-	-
	very complex or to be developed	-	1,2% (23,5%)	0,6% (11,8%)	1,2% (23,5%)	**3% (58,8%)**
Orientation of the world	utopia	0,6% (11,8%)	0,6% (11,8%)	-	-	1,2% (23,5%)
	dystopia	0,6% (11,8%)	0,6% (11,8%)	1,2% (23,5%)	1,2% (23,5%)	3,5% (70,6%)
	undefined	-	-	0,6% (11,8%)	-	0,6% (11,8%)
Intention of the project	problem-solving	0,6% (11,8%)	1,2% (23,5%)	0,6% (11,8%)	0,6% (11,8%)	**3% (58,8%)**
	question-framing	-	0,6% (11,8%)	1,2% (23,5%)	0,6% (11,8%)	2,4% (47,1%)
scale of change	individual/ behavioral	-	-	0,6% (11,8%)	0,6% (11,8%)	1,2% (23,5%)
	collective/ organizational	0,6% (11,8%)	0,6% (11,8%)	-	-	1,2% (23,5%)
	systemic/ structural	0,6% (11,8%)	0,6% (11,8%)	**1,2% (23,5%)**	0,6% (11,8%)	3% (58,8%)
change lever/driver	technical	-	0,6% (11,8%)	0,6% (11,8%)	**1,2% (23,5%)**	2,4% (47,1%)
	legislative (imposed)	0,6% (11,8%)	0,6% (11,8%)	-	-	0,6% (11,8%)
	societal choice	0,6% (11,8%)	-	**1,2% (23,5%)**	-	2,4% (47,1%)

Table 3 - Projects distribution by representation technique : digital (38% of all projects)

		N1	N2	N3	N4	all projects (38%)
Presence of humans		8,2% (21,7%)	10,6% (27,9%)	8,8% (23,2%)	5,9% (15,5%)	33,5% (88,2%)
Presence of technical systems and level of complexity	absence	0,6% (1,5%)	- -	0,6% (1,5%)	- -	1,2% (3,1%)
	simple	1,8% (4,6%)	0,6% (1,5%)	1,2% (3,1%)	- -	3,5% (9,3%)
	moderately complex	2,9% (7,7%)	**4,7% (12,4%)**	3,5% (9,3%)	2,9% (7,7%)	14,1% (37,2%)
	complex	1,2% (3,1%)	**3,5% (9,3%)**	1,8% (4,6%)	2,4% (6,2%)	8,8% (23,2%)
	very complex or to be developed	**3,5% (9,3%)**	2,4% (6,2%)	1,8% (4,6%)	2,4% (6,2%)	10,0% (26,3%)
Orientation of the world	utopia	7,6% (20,1%)	5,9% (15,5%)	3,5% (9,3%)	1,2% (3,1%)	**18,2% (48,0%)**
	dystopia	0,6% (1,5%)	3,5% (9,3%)	5,3% (13,9%)	6,5% (17,0%)	15,9% (41,8%)
	undefined	1,8% (4,6%)	1,8% (4,6%)	- -	- -	3,5% (9,3%)
Intention of the project	problem-solving	10,0% (26,3%)	8,8% (23,2%)	4,7% (12,4%)	4,1% (10,8%)	27,6% (72,8%)
	question-framing	2,4% (6,2%)	2,4% (6,2%)	1,8% (4,6%)	1,2% (3,1%)	7,6% (20,1%)
scale of change	individual/ behavioral	2,4% (6,2%)	**5,3% (13,9%)**	2,9% (7,7%)	0,6% (1,5%)	11,2% (29,4%)
	collective/ organizational	3,5% (9,3%)	**4,1% (10,8%)**	2,4% (6,2%)	2,9% (7,7%)	12,9% (34,1%)
	systemic/ structural	**4,1% (10,8%)**	1,8% (4,6%)	3,5% (9,3%)	**4,1% (10,8%)**	13,5% (35,6%)
change lever/driver	technical	4,1% (10,8%)	**6,5% (17,0%)**	2,9% (7,7%)	4,1% (10,8%)	17,6% (46,4%)
	legislative (imposed)	2,4% (6,2%)	2,4% (6,2%)	1,8% (4,6%)	1,2% (3,1%)	7,6% (20,1%)
	societal choice	3,5% (9,3%)	2,4% (6,2%)	**4,1% (10,8%)**	2,4% (6,2%)	12,4% (32,5%)

Table 4 - Projects distribution by representation technique: generative AI (57% of all projects)

		N1	N2	N3	N4	alll projects (57%)
Presence of humans		11,2% (19,6%)	10,6% (18,6%)	11,2% (19,6%)	14,1% (25%)	47,1% (82,5%)
Presence of technical systems and level of complexity	absence	0,6% (1%)	-	-	-	0,6% (1%)
	simple	2,9% (5,2%)	-	-	0,6% (1%)	3,5% (6,2%)
	moderately complex	4,7% (8,3%)	6,5% (11,4%)	2,9% (5,2%)	1,8% (3,1%)	15,9% (27,8%)
	complex	1,8% (3,1%)	4,7% (8,3%)	3,5% (6,2%)	4,7% (8,3%)	14,7% (25,8%)
	very complex or to be developed	4,1% (7,2%)	1,8% (3,1%)	7,6% (13,4%)	8,8% (15,5%)	22,4% (39,2%)
Orientation of the world	utopia	**7,1% (12,4%)**	5,3% (9,3%)	2,9% (5,2%)	**7,6% (13,4%)**	22,9% (40,2%)
	dystopia	5,9% (10,3%)	6,5% (11,4%)	**9,4% (16,5%)**	8,2% (14,4%)	**30% (52,6%)**
	undefined	1,2% (2,1%)	1,2% (2,1%)	1,8% (3,1%)	- -	4,1% (7,2%)
Intention of the project	problem-solving	12,4% (21,7%)	9,4% (16,5%)	8,8% (15,5%)	12,4% (21,7%)	**42,9% (75,3%)**
	question-framing	1,8% (3,1%)	**2,9% (5,2%)**	1,2% (2,1%)	0,6% (1%)	6,5% (11,3%)
Scale of change	individual/ behavioral	2,4% (4,1%)	1,2% (2,1%)	4,7% (8,3%)	5,3% (9,3%)	13,5% (23,7%)
	collective/ organizational	4,1% (7,2%)	**5,9% (10,3%)**	1,2% (2,1%)	1,2% (2,1%)	12,4% (21,6%)
	systemic/ structural	7,6% (13,4%)	5,9% (10,3%)	8,2% (14,4%)	9,4% (16,5%)	31,2% (54,6%)
Change lever/driver	technical	5,3% (9,3%)	6,5% (11,4%)	11,8% (20,6%)	**13,5% (23,7%)**	37,1% (64,9%)
	legislative (imposed)	1,8% (3,1%)	**2,9% (5,2%)**	1,2% (2,1%)	0,6% (1%)	6,5% (11,3%)
	societal choice	**7,1% (12,4%)**	3,5% (6,2%)	1,2% (2,1%)	1,8% (3,1%)	13,5% (23,7%)

Table 5 - Proportional comparison between 3 representation techniques

		manual	digital	AI	All projects
Presence of humans		82%	88,2%	82,5%	85%
Presence of technical systems and level of complexity	absence	11,8%	3,1%	1,0%	2%
	simple	11,8%	9,3%	6,2%	8%
	moderately complex	23,5%	37,2%	27,8%	31%
	complex	0,0%	23,2%	25,8%	24%
	very complex or to be developed	**58,8%**	26,3%	39,2%	35%
Orientation of the world	utopia	23,5%	**48,0%**	40,2%	42%
	dystopia	**70,6%**	41,8%	52,6%	49%
	undefined	**11,8%**	9,3%	7,2%	8%
Intention of the project	problem-solving	**58,8%**	72,8%	75,3%	74%
	question-framing	**47,1%**	20,1%	11,3%	15%
Scale of change	individual/ behavioral	23,5%	**29,4%**	23,7%	26%
	collective/ organizational	23,5%	**34,1%**	21,6%	26%
	systemic/ structural	58,8%	35,6%	54,6%	48%
Change lever/ driver	technical	47,1%	46,4%	64,9%	57%
	legislative (imposed)	11,8%	20,1%	11,3%	15%
	societal choice	47,1%	32,5%	23,7%	28%

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Human-Centered Algorithm Design: A Case Study in Expanding Philanthropic Reach with Public Data

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ABSTRACT | This working paper proposes a reimagined Human-Centered Algorithm Design (HCAD) framework to embed human-centered and equity-focused principles within algorithmic systems. HCAD looks beyond traditional 'black box' and "glass box" approaches to creating algorithms. It positions algorithm development as a design challenge instead of a technical one. The eight steps of Human-Centered Algorithm Design include deep diving into the problem context, mindfully selecting your data, creatively considering models, designing the algorithm, iterating with people, scrutinizing the impact, and using it responsibly. Throughout the steps, HCAD designers must also integrate responsibility pauses throughout the design process to reflect on potential biases and societal impacts. Using a case study approach, this study explores the application of HCAD in a venture philanthropy firm's effort to broaden its funding pipeline beyond established networks using big data sources. By applying HCAD, the organization expanded its pool of potential grantees 25 times and enhanced representation across all U.S. states. The case study illustrates how HCAD reinforces the importance of ethical leadership in digital design by actively involving affected communities in algorithm development. HCAD offers a more broadly replicable model for ethical digital practices.

KEYWORDS | Human Centered Algorithm Design, Human Centered Design, Responsible Design, Data, Embodied Cognition

1. Introduction

Algorithms are step-by-step instructions for solving problems or accomplishing tasks (Deng, 2018; Howard, 2022). In recent years, algorithms have become increasingly powered by datasets consisting of large numbers of records and features (Zhou et al., 2017). While much has been accomplished with these big datasets, there remain limitations regarding quality, complexity, and noise (Dhawan et al., 2018; Zhang, 2016). Further, there is an accelerating trend of algorithms making decisions affecting humans with minimal or no direct human input (Bader et al., 2019). Algorithms are here to stay, but keeping humans-in-the-loop is critical to maintaining transparency, fairness, and accountability for their outputs (Rahwan, 2017).

Recent international initiatives have shaped the way design practices work with algorithmic and AI systems. The Human+AI Initiative at Carnegie Mellon University (CMU) explores ways AI can work alongside human designers (Carnegie Mellon University, 2025). The research and educational initiatives at POLIMI are both designed with service to humanity as a core tenet (Politecnico di Milano, 2025). The Digital Design Lab at the L'École de Design examines how natural intelligence of living systems merges with artificial intelligence to create better user experiences (L'École de Design Nantes Atlantique, 2025). The approach to algorithm design outlined in this paper complements these initiatives by requiring ethical reflection and stakeholder co-design throughout the algorithm development process.

Drawing on central concepts in human-centered design - including designing with the individuals who use or are affected by a product, service, or system - this working paper positions an evolved concept of human-centered algorithm design (HCAD). Here, HCAD is introduced as a way to leverage the utility of algorithms while addressing the underlying limitations of the big datasets that power them.

This working paper is structured into four sections. The Conceptual Framing includes an overview of the supporting literature. The Methodology outlines the nature of the case study used and provides context. Next, a Worked Example demonstrates the core steps of human-centered algorithm design using a case study from the venture philanthropy sector. Lastly, the Discussion section distills high-level takeaways, implications, and limitations.

2. Conceptual Framing

The following conceptual framing combines insights from traditional and human-centered algorithm development, human-centered design, and embodied cognition to offer an integrated perspective on designing algorithms responsibly with the people who use them and are impacted by them.

2.1. Algorithm Development

Over the past few decades, data generation and storage capability growth ushered in the era of "big data" (Shi et al., 2019). This development was followed by the rapid development of sophisticated machine-learning algorithms designed to process these big datasets. Several successful examples of machine learning algorithms are being applied across industries using natural language processing, predictive analytics, and

image recognition, among others (Goldberg, 2017; Christou et al., 2020; Liu et al., 2020). These domain applications were then carried over into various sectors, including healthcare, criminal justice, and corporate contexts (Cahan et al., 2019; Zavrsnik, 2019).

Traditionally, algorithms applied in these contexts have been designed using a "black box" where the algorithmic outputs are accompanied by unclear explanations (Holm, 2019). An alternative approach, "glass box," has emerged where the algorithms are more interpretable (Caruana et al., 2022). Efficiency and accuracy are among algorithms' most commonly cited benefits (Al-Jarrah, 2015). However, several studies have highlighted the limitations and risks associated with algorithms, including bias amplification, data quality, lack of transparency, and overreliance on automation, among others (Bandy, 2021; Nagendran et al., 2020; Goddard et al., 2012).

2.2. Human-centered Design

Human-centered design is generally understood as designing with rather than for the individuals who use or are affected by a product, service, or system (Norman, 2014; Rouse, 1993; Giacomin, 2014). While it often appears alongside terms like "design thinking" and "creative problem solving," unlike these design practices, human-centered design focuses heavily on usability, user context, and minimizing negative impacts. It places human needs, behaviors, and limitations at the center of decisions (MacDonald, 2005).

Human-centered design creates solutions starting with people's needs, environments, contexts, actions, and behaviors (Norman, 2014; Rouse, 1993). It uncovers these through qualitative research techniques designed to unlock empathy, such as interviews, observations, collaborative testing, and iteration (Maquire, 2001). Methodological rigor is an important but often overlooked component of human-centered design. Without it, designers succumb to biases, prioritizing their knowledge, perspectives, and practices (Steen, 2008 & 2011).

2.3. Human-centered Algorithm Design

Human-centered algorithm design is an emerging approach that aims to *'center the process of designing algorithmically based systems around humans'* (Baumer, 2017). Centering the design around the users of the algorithm, regardless of whether it has been specifically called Human Centered Algorithm Design, has achieved traction in a wide variety of domains (Lee, 2017; Riedl, 2019; Zhang, 2002; Shneiderman, 2020). However, these approaches often think about the users who interact with or use the algorithms but not those impacted by their outputs or decisions. In contrast, the Human-Centered Artificial Intelligence (HCAI) initiatives at Stanford HAI (2025) work to enhance human flourishing through AI systems while Explainable AI (XAI) initiatives work on algorithmic transparency (Minh et al., 2021; Ding et al., 2022; Giulia Vilone et al., 2021). HCAD addresses a different but related area. It focuses not only on end-users but also on all those affected by algorithmic decisions, with a focus on co-design and iterative inclusion. In doing so, HCAD bridges the gap between technical interpretability and social responsibility.

However, there is a noticeable grey space between these interpretations of human-centeredness. People are often directly impacted by traditional and AI algorithms even if they do not directly use them. For instance, an algorithm that decides if someone should receive a mortgage for a car is used by a mortgage broker. However, the decision impacts several stakeholders including potential buyers, prospective sellers, and buyers' agents. Similarly, a recruiter uses an algorithm to filter candidates. This decision impacts the hiring manager, the candidates, and the company legal team. To be truly human-

centered, algorithm design needs to evolve to embody the central tenets of human-centered design, including having empathy for stakeholders involved in the problem landscape.

2.4. Embodied Cognition For Algorithmic Learning

Cognition has traditionally been viewed as abstract thought and processing in the mind, disconnected from the body and the context in which it is situated (Glenberg, 2015). Embodied cognition challenges this traditional approach and suggests that the mind, the body, and the sociocultural context are interconnected. As a result, thoughts and the meaning of information can be grounded in sensorimotor experiences through this lens (Glenberg, 2015). Although questioned by some in abstraction (Goldinger, 2016), evidence from educational research suggests that embodied cognition learning strategies can enhance understanding and improve learning outcomes, particularly in STEM disciplines and multimedia (Kontra, 2012; Skulmowski, 2018). These strategies can also reduce cognitive load and improve the comprehension of abstract concepts (Fiorella, 2021; Weisberg, 2017). As a result, when working with stakeholders who have observed or potential apprehension to STEM concepts, such as algorithms, turning to embodiment as a strategy can be very effective for empowerment.

3. Methodology

This paper leverages a case study of Human-Centered Algorithm Design applied to a venture philanthropy firm using the Internal Revenue Service's Form 990 dataset to provide a worked example of the proposed framework first outlined in Forshaw (2024).

3.1. Case Study Context

Venture philanthropy applies business and VC techniques to philanthropic goals. It accounts for a large share of philanthropic giving in the United States. However, like many sectors, venture philanthropy has inherent inequities in its norms and practices. For instance, the sector has historically favored organizations with leaders that possess extensive philanthropy networks. As a result, less connected organizations typically receive less access to venture philanthropic funding.

A venture philanthropy firm working in the United States set out to address this inequity. They aimed to use large and complex datasets to access a list of all registered charitable organizations in the United States and create a new potential pool of organizations to enter the top of their funding pipeline.

However, this novel approach gave many of their existing nonprofit partners cause for concern about the reasonable potential for inequities to be amplified or reproduced. To address this, the firm applied the (HCAD) approach (Forshaw, 2024) to expand and diversify its pipeline. The HCAD approach involved collaboration with stakeholders from diverse backgrounds to co-design an algorithm that identified potential organizations for funding using the IRS Tax Exempt Organization dataset (Internal Revenue Service, 2023).

4. Human-Centered Algorithm Design with Public Datasets

Based on the tenets of human-centered design and traditional algorithm design outlined in the conceptual background, HCAD involves stakeholders in co-designing explicitly human-centered algorithms. These algorithms are rounded in human needs and contexts and evaluated for potential negative implications or unintended consequences. Through this eight-step approach (see Figure 1), users are involved in the complete design process, fully comprehend how and why it works that way, and have a voice in the cost-benefit analysis of potential impacts. This is essential because the potential impacts will likely affect them and their community.

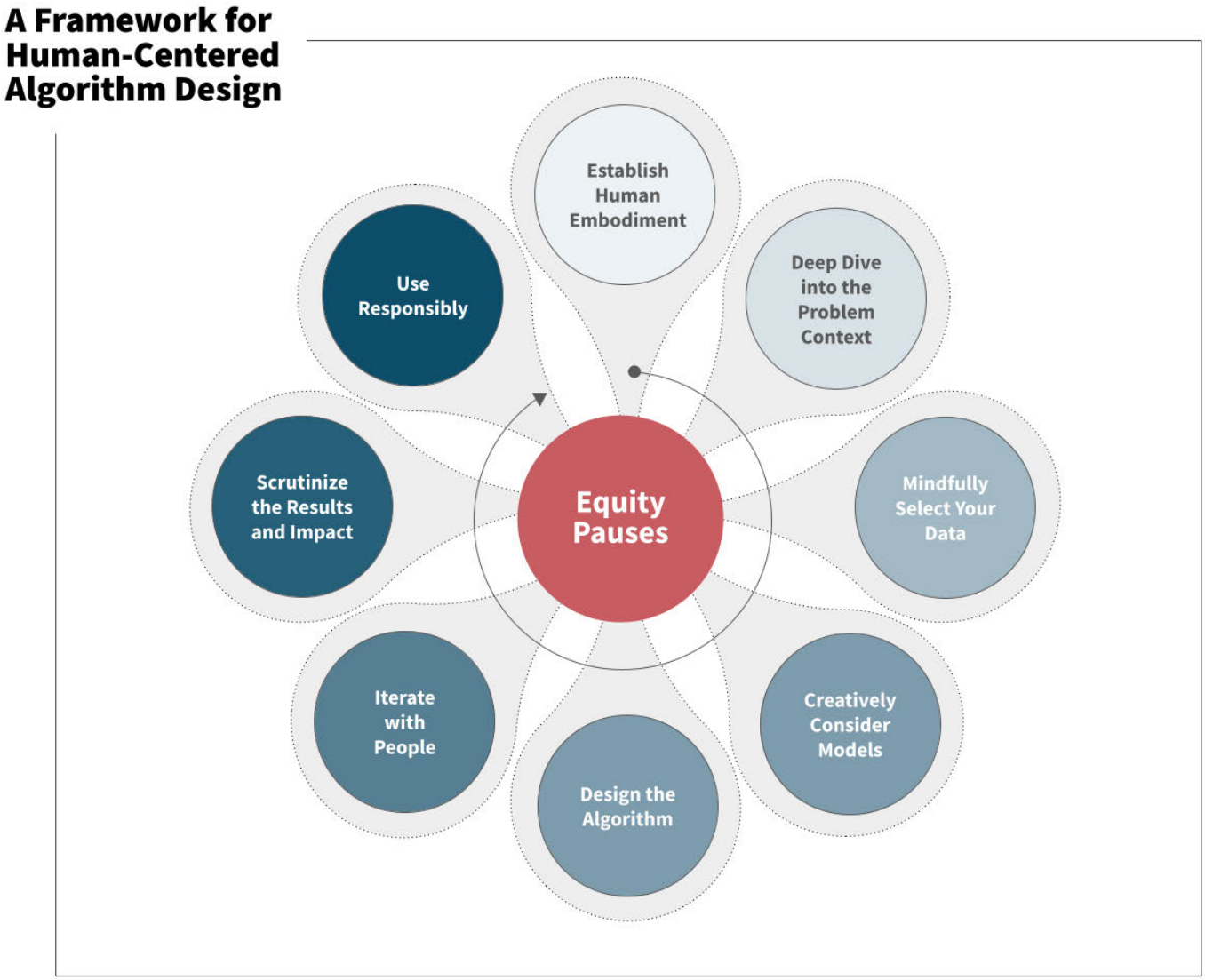

Figure 1. A Framework for Human-Centered Algorithm Design. Reproduced with Permission from Forshaw, 2024.

4.1. Human-Centered Algorithm Design Worked Example

The descriptions below outline an eight-step process for developing and implementing a human-centered algorithm. By drawing upon the literature on human-centered design, embodied cognition, and algorithm design, the following case study demonstrates how these principles were operationalized in venture philanthropy.

Step 1: Establish Human-Embodiment

This step involves including individuals traditionally excluded from technological spaces

and supporting them through principles of embodied cognition (Glenberg, 2015) to demystify abstract algorithmic processes and empower traditionally excluded participants. For the venture philanthropy firm, this involved guiding participants through how algorithms extract, transform, and load data using interactive sessions on digital whiteboards. Before then, potential biases and unintended consequences were explored in a workshop designed to pause and focus on discussing and foreshadowing how they might reinforce existing inequities.

Step 2: Deep Dive into the Problem Context

During this step, staff and 17 external "network nodes" from diverse backgrounds were interviewed about the challenges with equity in venture philanthropy pipeline development. The goal was to ensure varied perspectives to shape a comprehensive problem statement and a deep understanding of the context within which the algorithm would operate. The list of stakeholders was determined using an intentional focus on varied perspectives and then enhanced using a snowball sampling method that connected the venture philanthropy firm to additional stakeholders across the country. By actively engaging diverse stakeholders, this step mirrors the human-centered design emphasis on understanding user contexts and experiences as outlined by Norman (2014).

Step 3: Mindfully Select Your Data

Like traditional algorithm development, this step involves aligning requirements with available data. In the venture philanthropy firm case, organizations had to be nonprofits above a revenue threshold and be aligned with their definition of economic mobility work. Beyond the algorithmic objectives, the firm aimed to facilitate a discussion on the inequities present in the philanthropic sector. Thus, the data needed to be publicly available so that others could replicate the process outlined. This set of requirements led to selecting Form 990 data available through the Internal Revenue Service. These annual filings contain information on revenue and programmatic details, among other information. This careful alignment of data with the design requirements reflects prior research on mitigating biases inherent in big data (Bandy, 2021; Nagendran et al., 2020), ensuring that the process is both transparent and accountable.

Step 4: Creatively Consider Models

There are almost two million nonprofits in the United States (Urban Institute, 2021). This step involves selecting an explainable model capable of identifying organizations that meet the requirements outlined or provide the reasons they were excluded. Every stakeholder acknowledged that making tradeoffs is a key part of the design process and must be made explicit. To accomplish this, a rule-based model was chosen. This design choice was influenced by prior work emphasizing transparency and explainability in algorithmic models (Caruana et al., 2022), ensuring stakeholders could trace decision paths.

Step 5: Design the Algorithm

This step involves translating the findings from interviews, desk research, and workshops into a series of rules that can be encoded into the algorithm. Given that only nonprofits file Form 990s, the dataset inherently met this requirement. The rules regarding total revenue were set. A bag-of-words model was developed to identify the organizations aligned with the venture philanthropy firm's focus; it translated interview and workshop models into a set of key terms that could be applied to the text field containing programmatic information within the Form 990s. The bag of words was designed as a series of words with varying levels of priority.

Step 6: Iterate with People

Algorithms need to be refined based on substantive feedback from real people using them and impacted by the algorithm's decisions. Think of this as keeping humans in the loop in algorithmic decision-making. In this step, the venture philanthropy firm gathered feedback from the people most affected, refining the algorithm with new "bags of words" and verifying its outputs against a previous reference list. Once stakeholders felt it accurately captured their needs and experiences, the venture philanthropy firm's team again held a workshop designed to pause and focus on discussing how its output might reinforce existing inequities.

Step 7: Scrutinize the Results and Impact

Once the algorithm was satisfactory, the next step involved testing the algorithm's outputs by sampling and reviewing them. This was done by engaging a two-pronged approach to enhance the precision and fairness of the algorithm. The first part of the approach was to benchmark the algorithm's output against a reliable dataset to evaluate accuracy. The second part involved conducting a review of specific outputs to discern nuanced intricacies and determining if the organizations returned really belonged in their pipeline pool. With each round of testing, they refined the bag of word lists, introduced more complex logic, such as establishing priority levels, and crafted a "negative" list. The result was a consensual algorithm reflecting stakeholder-informed trade-offs and 2,465 organizations that reflected the venture philanthropy firm's investing landscape.

Step 8: Use Responsibly

This final step is enduring. It requires the venture philanthropy firm to understand and acknowledge the algorithm's limitations, remain transparent about its potential unintended consequences, and develop a plan for continuous evaluation. Over time, they will need to update threshold criteria and refine their word lists while also maintaining awareness of the list's limitations, specifically regarding potential exclusions and their reasons.

5. Discussion

5.1. Key Takeaways

Key Take Away 1: Public Data Needs Human Centeredness

Human-centered algorithm design is especially critical when working with public data because such data inherently represents and impacts human communities. Public datasets like the IRS 990 filings provide information about nonprofits—organizations composed of people that serve human needs. However, conventional algorithmic approaches often center solely on the end-user (for example, a venture philanthropy manager) while neglecting the broader community affected by algorithmic decisions. HCAD bridges this gap: it ensures that direct users, the people within the organizations, and the constituencies served by these organizations were considered during the design process. This is particularly important given the well-documented challenges with public data, such as the inaccuracy in the data can propagate errors and unintended consequences (O'Neil, 2016; Pasquale, 2015; Kitchin, 2014). Thus, HCAD not only enhances the ethical rigor of data interpretation but also reinforces the accountability and transparency necessary to use public data to serve as a public good.

Key Takeaway 2: Human-centered Algorithm Design Helped Create a Shared Mental Model Among Diverse Stakeholders

Bringing diverse stakeholders together to develop a shared mental model for what kind of organization they would fund was a forcing function for clarifying previously ambiguous areas. A central element of this is ensuring every participant is empowered to talk about algorithms, which can be done quickly and effectively by embodying the algorithm (as inspired by embodied cognition theories, e.g., Glenberg, 2015).

5.2. Implications for Practitioners and Researchers

Implication 1: Increase Your Human Centeredness, Even if Only by a Little Bit

The eight-step HCAD process demonstrates that each step adds discrete, measurable value to the final algorithm—even when stakeholder involvement is limited to one or a few steps. For example, insights from stakeholders engaged solely in initial context-setting or data-selection can independently enhance transparency, reduce biases, and refine system performance. A single, well-executed step is far better than no human-centered intervention at all.

Implication 2: Recognize That Different Contexts Might Require a Different Mix of Things

The eight-step HCAD approach is a guide, a mental model, a heuristic, and a worked example. Different public data sets and contexts—each with unique challenges like data errors or misclassification (e.g., inaccurate NTEE codes)—may require tweaks, such as more robust data validation or community-driven model evaluations. Practitioners might make different decisions about their processes, and research could be well-positioned to consider what different contexts need for their unique realities. This contextual flexibility is rooted in the conceptual framing, which underscores the need for adaptive, human-centered strategies that address the specific limitations of each environment.

Implication 3: Empower Participation with Embodied Cognition of How Algorithms Work

By physically embodying the algorithm you are designing, you can empower stakeholders to participate and engage in your process. Practitioners might run workshops using sticky notes to walk through logic steps. This practice, grounded in embodied cognition theory (Glenberg, 2015), helps demystify abstract algorithmic logic and enhances participation, especially for those lacking technical expertise. In turn, it fosters more informed, inclusive, and ethical algorithmic outcomes. A consideration for further research might be to more closely examine whether stakeholders who traditionally lack technical expertise gain a deeper understanding—and thus stronger empowerment—of algorithmic outcomes through embodied cognition pedagogical practices.

Implication 4: Consider using human-centered algorithm design elements for the design of many different types of algorithms

Regardless of the algorithm type, refining algorithms using HCAD principles remains valuable. For example, implementing a neural network would benefit from bringing together diverse stakeholders most impacted by the algorithm's output to dive deep into the problem context before the algorithm design process begins. Even if this is the only HCAD step the neural network design team incorporates into their process, the finished product will be better. Whether dealing with complex neural networks or more traditional predictive models, the principles of human-centered design and iterative refinement are universally applicable.

5.3. Limitations

It is important to acknowledge that this study is a case analysis of one application of Human Centered Algorithm Design in a limited context. As a result, these findings are not uniformly generalizable to every other possible application. However, that was never the purpose; instead, this study aimed to propose an extension of human-centered algorithm design to include the people impacted by the algorithms and to discuss a specific application to large public datasets.

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ethical leadership
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Innovative Ecological Framework for Intangible Cultural Heritage Exhibition and Dissemination in the Digital Survival Era

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In the "digital survival" era, the exhibition and dissemination of intangible cultural heritage (ICH) face unprecedented opportunities alongside significant challenges. As digital technologies increasingly permeate cultural sectors, they introduce both innovative possibilities and critical dilemmas concerning the preservation and authenticity of ICH. This paper aims to construct an innovative ecological framework for ICH exhibition and dissemination, specifically addressing key issues posed by digital technology: the overshadowing of ICH's original forms, the tension between technological dominance and emotional engagement, and the challenges inherent in digitally recording and authentically reproducing ICH information.

The findings suggest that the strategic introduction of smart technologies can offer new avenues for the protection and transmission of ICH, empowering it to maintain a vital role within modern society. Future research should focus on optimizing these technologies and methodologies, exploring diverse application scenarios to further enhance the sustainable development and cultural transmission of ICH in the digital era. By fostering a comprehensive understanding of these ecological systems, we can ensure that ICH is not only preserved but also invigorated, enabling it to thrive amidst the complexities of digital evolution. This research lays a foundation for continued dialogue and exploration into innovative approaches for ICH, advocating for a future where cultural heritage is celebrated and safeguarded through thoughtful integration with technology.

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Integrating Ethics in an AI-Enhanced Double Diamond Framework: Zooming In and Out using Ethical Lenses

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ABSTRACT |

This research explores the integration of generative AI into creative industries using a modified double diamond framework that balances human agency and ethical oversight. By examining AI's role in digital design, industrial product design, and marketing/communication, the study moves beyond traditional AI ethics by embedding ethical considerations as creative constraints rather than limitations. Through a dynamic "zooming" methodology, this approach ensures responsible AI use while enhancing innovation. Such structured ethical considerations align with existing discourse on AI ethics, which emphasizes the need for practical implementation rather than abstract principles (Bleher & Braun, 2023; Dignum, 2019).

A core element of the framework is a modular set of ethical lenses derived from virtue ethics, deontology, care ethics, consequentialism, and existentialism. These perspectives provide structured ethical guidance while fostering creativity, reinforcing research that demonstrates how constraints can serve as catalysts for innovation (Leach, 2022; Rosso, 2014). Creativity within AI-assisted processes is often shaped by boundaries that guide ideation rather than restrict it (Boden, 1998). At crucial points in the project the lenses are calibrated with industry supported methods routed in a streamlined version of multi-capital theory (Baue, 2020; McElroy & Thomas, 2015).

This methodological approach reflects broader efforts in AI ethics to create actionable frameworks that integrate seamlessly into professional workflows (Georgieva et al., 2022). It contributes to the discourse on AI ethics by offering concrete tools for creative practitioners while addressing concerns about AI's impact on human creativity and autonomy, emphasizing the need for keeping the human in the loop (Buçinca et al., 2021; Eapen et al., 2023; Liu & Nah, 2020; Vallor, 2024). By moving beyond theoretical discussions, this research provides a pragmatic approach to ensuring ethical AI use in the creative industries, fully realizing in what sense the tools we use shape us (Hurme & Jouhki, 2017).

KEYWORDS | ARTIFICIAL INTELLIGENCE (AI), ETHICS, DESIGN THINKING, DOUBLE DIAMOND, MORAL VALUES, ETHICAL THEORIES, CREATIVITY CONSTRAINTS, ETHICAL LENSES, HUMAN-AI COLLABORATION

1. Introduction

The rapid advancement of generative AI technologies has revolutionized the creative industry, offering new tools for brainstorming, prototyping, and content creation. However, this technological evolution brings with it a host of ethical challenges that must be addressed to ensure responsible use. This paper proposes a modified double diamond framework that integrates ethical considerations into the creative process, ensuring that AI tools are used in a manner that enhances human creativity while adhering to ethical standards.

The research focuses on three distinct application domains: digital design, industrial product design, and marketing/communication. Rather than treating ethics as a restrictive set of guidelines, our approach integrates ethical considerations as creative boundaries that enhance rather than inhibit the creative process. This integration is achieved through a dynamic "zooming" methodology: "zooming in" to examine the rationale and value of specific AI tools, and "zooming out" to evaluate broader implications using ethical lenses (Munn, 2023; Steen, 2023). These lenses are calibrated using techniques derived from the multi-capital accounting practice at crucial transition points in the design process (Baue, 2020).

This modular set of ethical lenses derived from major philosophical traditions, including virtue ethics, deontology, care ethics, consequentialism, and existentialism, are therefore central in our methodology. These lenses serve a dual purpose: they provide structured ethical guidance while promoting playful exploration within the creative process. This approach acknowledges research showing that creativity often thrives within well-defined boundaries, transforming ethical constraints into catalysts for innovation (Meincke et al., 2024).

Initial testing of the methodology using the enhanced double diamond framework has been done with student groups in creative curricula and select companies from the three target domains. Comprehensive testing with the integrated ethical lenses methodology is planned for completion by June 2025. We anticipate that our findings will demonstrate how this ethical framework can ensure responsible AI implementation while enhancing creative outcomes through meaningful constraints and deeper engagement with design choices.

The research aims to contribute to the growing discourse on responsible AI implementation in creative industries while offering practical tools for practitioners. It addresses a critical gap in current AI ethics discourse by moving beyond abstract principles to provide actionable frameworks for creative professionals (Bleher & Braun, 2023; Dignum, 2019). It demonstrates how ethical considerations can be seamlessly integrated into existing design methodologies while enhancing rather than impeding creative processes.

Our approach is grounded in the belief that ethics should not be seen as a nuisance but as a catalyst for innovation (Rosso, 2014). By incorporating ethical lenses derived from major philosophical traditions, we provide a structured yet flexible framework that guides

designers in making ethically informed decisions throughout the creative process (Boden, 1998). This framework is particularly relevant for professionals in creative agencies, where the integration of AI tools is becoming increasingly prevalent and where critical ethical considerations often are overlooked.

In section 2 we explain how the AI enhancement of the double diamond framework is conceptually conceived. It will recap the essential principals of the double diamond framework and its possible variants and continues with an explanation of the place of man and machine in the creative process visualized with this framework. We also aim to show how this can be practically implemented using a modularly constructed toolset.

Section 3 explains what the ethical lenses are and how they can be implemented as building blocks in a versatile way within the toolset developed for the AI enhanced double diamond. We also take a look at the concept of zooming in and zooming out and the principal of calibrating the ethical lenses.

Finally, section 4 goes into the more specific trials and test cases that have already been done using the framework and describes the major test case that will take place in spring 2025. We also describe possible future work that could be done to make the practical implementation of this framework more accessible to a wider public, not only aiming at the traditional creative industries but also the domains of business, technological innovation and problem solving.

2. The AI Enhanced Double Diamond Framework

2.1. The Double Diamond Framework

The double diamond framework, developed by the British Design Council, is a widely used design process model that consists of four phases: Discover, Define, Develop, and Deliver (Design Council, 2025). A comprehensive view of the process can be seen in Figure 1.

Each diamond contains divergent and convergent thinking, allowing designers to explore a wide range of possibilities before narrowing down to the most viable solutions. Within the diamond a whole set of specific techniques can be deployed to facilitate the creative process adapted to the needs of the stakeholders and the team involved in the process. This methods bank is not a fixed set of tools but a flexible collection of methods usable in different creative contexts. Examples thereof can be found in publications of the Design Council (Design Council, 2025) or other organizations like IDEO.org (IDEO.org, n.d.). As can be seen in the Design Councils' (2025) Figure 1, this process is not linear but highly iterative.

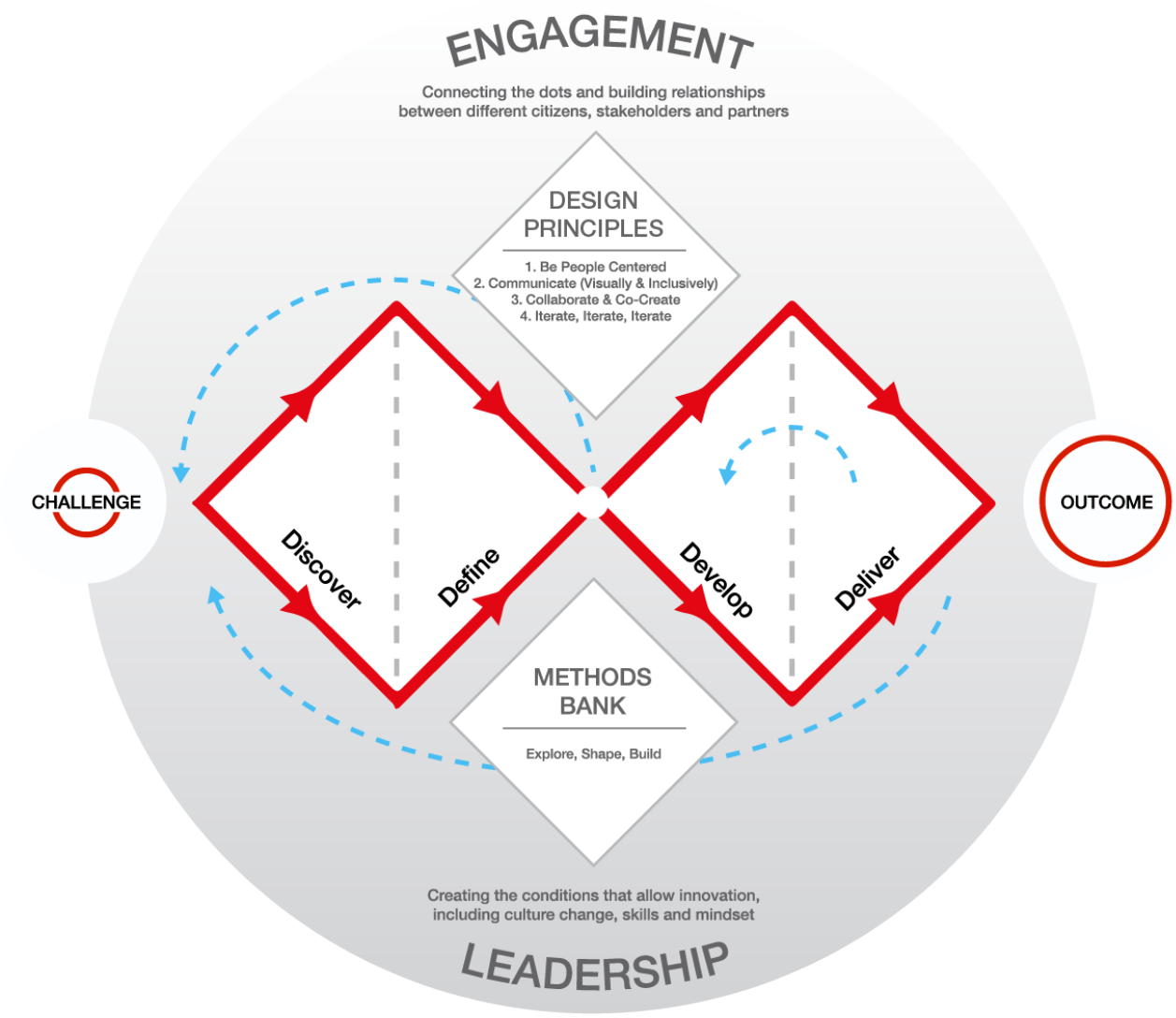

Figure 1: The Double Diamond Framework. CC-BY - This work by the Design Council is licensed under a CC BY 4.0 license.

The different diamonds or even the separate components within a diamond can be split among different teams, which means that in many cases the practical execution of a creative project can involve a variety of people with different skill sets throughout the process. This allows for delegation of tasks and diversification of insights, but also requires special care when transferring results from one team to another. The risk of losing the big picture in the process is not imaginary in this context (Kwon et al., 2021).

While such division of tasks is common in practice, for the purposes of our research, we will assume that the design team completes the entire diamond cycle, or at least one complete diamond.

2.2. Enhancing a solid framework using AI

As mentioned in the introduction, one of the most important contemporary developments in the creative sector is the prominent place that artificial intelligence is taking up, especially since the advent of generative AI (Eapen et al., 2023). A vast selection of AI-tools are available today to aid in the creative process, from aiding in research, drafting and impersonating personas to brainstorming and creating visual drafts. Not only professional designers but students or the public at large can access these tools for free or for a small fee. It is evident that this has a major impact on the design process itself (Benjamin et al., 2024). The main purpose of our research project is to try to incorporate

these new tools at our disposition in a responsible and sensible way. The development of an AI enhanced double diamond framework is the path we are following to realize this end goal.

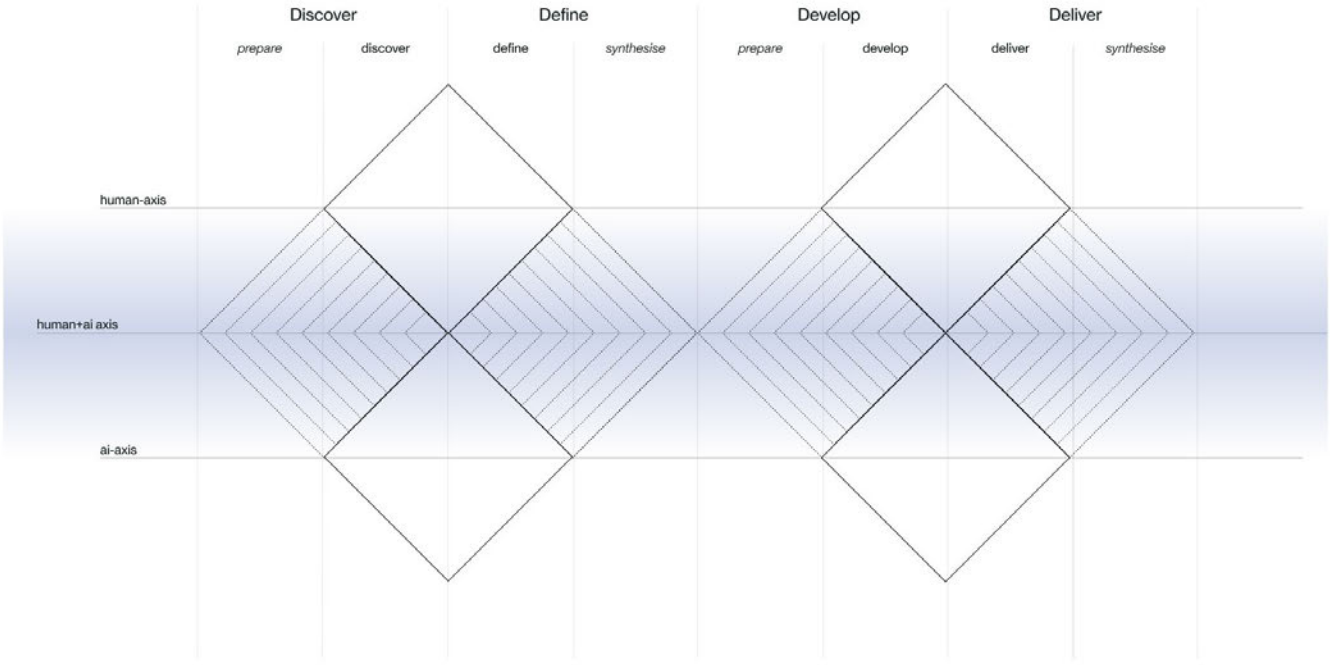

Figure 2: The augmented double diamond (Ganzevles, 2024).

Figure 2 details the augmented double diamond we are proposing. It consists of some additional phases and layers. Each diamond has been separated into a human part and an AI part on the vertical axes, in order to facilitate the human-AI cooperation within the model. Horizontally this has an impact on the different phases. The added prepare and synthesize phases, are very welcome in the context of tool utilization planning and evaluation, as well as for the ethical lenses' calibration and evaluation which will be introduced in section 3.3. A previous publication by one of the team members of the research project explains clearly what the logic is behind the theory and describes the practical experiments conducted with this model (Ganzevles, 2024).

2.3. Modular implementation

While the augmented double diamond model sketches a conceptually rich and clear picture of how this established framework can be enhanced to encompass artificial intelligence within the creative process, it remains largely theoretical and requires practical adaptation for real-world application.

The practical application of the framework begins with the preparation phase, where the pipeline within the diamond is prepared. In this phase, the design team assesses the challenge at hand and conducts a primary evaluation to determine whether to proceed with the challenge, based on legal, ethical and practical considerations. Legal and practical considerations are dependent on the time, place and available human and other resources at hand (Engelfriet, 2023). This evaluation serves as a straightforward calculation to determine the team's capacity to execute or delegate the proposed challenge. The ethical considerations, on the other hand, are dependent on the culture, values and the implemented evaluation process used by the design team. This aspect is

closely related to the calibration phase of the ethical lenses described in 3.3.

Once the project has been accepted, the team needs to consider the building blocks required to achieve the desired result. As previously mentioned, various techniques are available for the different standard phases in the double diamond framework. An exemplary but far from exhaustive list of methodologies or techniques can be listed here (Elmansy, 2021):

- discover phase: empathy mapping, persona building, surveys, interviews, focus groups, literature review, …
- define phase: user stories, value propositions, root cause analysis, boundary examination, morphological analysis, …
- develop phase: scamper, real life prototyping, cherry split, biomimicry, a day in the life of, …
- deliver phase: user acceptance testing, usability testing, user feedback analysis, six thinking hats, …

The design team working on the challenge will identify the methodologies used in order to construct a pipeline to traverse through one or both of the diamonds.

Templates that have some, all or no artificial intelligence components can be constructed for each technique or tool. An example of such a template can be found in Figure 3. It is within this pipeline using comparable templates that ethical lenses will be deployed, as described in the following section.

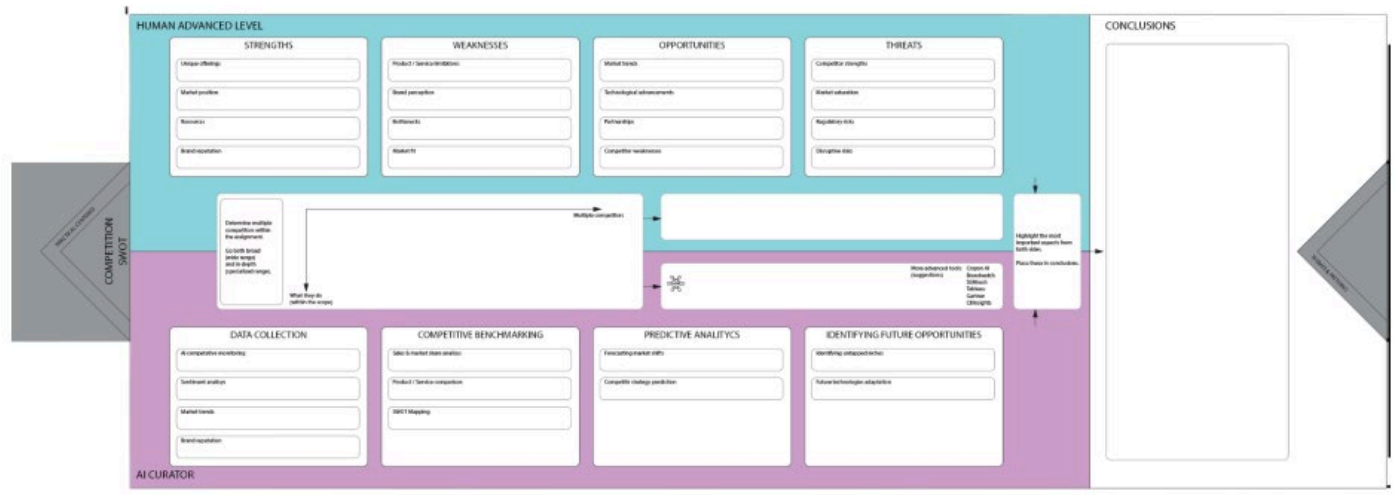

Figure 3: Human-AI version of a SWOT analysis (adapted from Demortier, 2024)

The evaluation of what template to use for each method is a decision the design team must make during each preparation phase. Leadership in this decision-making process depends on the team's working culture. As suggested in another paper written in the context of this research project, adopting the role of a conductor is worth considering (Hofman, 2024). This role can be taken up by a senior designer or a sub-team of experienced designers.

Going through this pipeline with one or more iterative loops within it, ultimately leads to the synthesize phase. This phase is somewhat comparable to the retrospective phase known from scrum (Schwaber & Sutherland, 2020), sharing many of the same objectives. It is intended to evaluate the functioning of the team as well as of the utility of the tools, methods and techniques used in the normal pipeline. As a result of this phase an evaluation of templates is also in order. Adjustments can be made to the balance

between human and machine contributions, and new templates can be created to increase or decrease reliance on either component.

The key difference between the scrum based retrospective and the synthesize phase, is that the latter leads to a follow up phase in the second diamond or to a retake of the whole first diamond. The consequences of the synthesize phase are therefore quite important and sufficient time should be reserved for it. Even at the end of the second diamond, the decision to finish the project and deliver the end product or service, or go back to the first or second diamond has an enormous impact on all aspects of the project.

3. Implementing Ethical Lenses

3.1. The Relevance of Ethical Traditions in Creativity

The intersection of ethical traditions and creative processes has taken on new urgency in the era of generative AI. Drawing from virtue ethics, which emphasizes the cultivation of moral character, creative professionals must develop virtues like transparency and intellectual honesty in their use of AI tools (Vallor, 2016). Meanwhile, deontological ethics provides crucial guidance about respecting human dignity and autonomy in creative work, while consequentialist approaches help evaluate the broader societal impacts of AI-driven creative processes (Wright, 2022).

Traditional ethical frameworks, from care ethics' emphasis on relationships and responsibility to contractarian perspectives on fairness and consent, offer valuable insights as AI systems trained on vast datasets generate new content. These frameworks help address questions about the potential displacement of human creators and the authenticity of AI-generated art (Risse, 2023). Existentialist ethics, with its focus on human freedom and authenticity, raises particularly relevant questions about maintaining genuine human agency in an AI-augmented creative landscape (Terzis, 2020).

Each of these traditions also has its drawbacks (Buyl & De Bie, 2024; Munn, 2023; Raghavan, 2024), which makes it interesting to use more than one ethical tradition to take on the diverse range of ethical challenges posed by the use of new generative AI tools and what they produce.

For digital designers, product designers, and marketing professionals, these ethical traditions provide practical guidance. Virtue ethics can inform the development of professional integrity, while care ethics highlights responsibilities to stakeholders and communities. Deontological principles help establish boundaries around data privacy and manipulation, while consequentialist thinking aids in evaluating the long-term impacts of AI-powered design and marketing strategies. Contract theory offers frameworks for establishing fair terms of AI use and data collection.

However, AI can also be an impressive new creative tool that, when thoughtfully integrated with these ethical traditions, might enhance rather than diminish human creativity. The key lies in developing frameworks that synthesize virtue-based, duty-based, and consequence-based approaches while respecting intellectual property rights, maintaining transparency about AI involvement, and preserving the economic viability of creative professions. This requires balancing innovation with responsibility, ensuring that our embrace of new creative possibilities aligns with enduring ethical principles.

3.2. The Concept of Lenses

To integrate ethics into the double diamond framework, we propose the use of ethical lenses derived from six major philosophical traditions:

- virtue ethics: focuses on the moral character of individuals and the cultivation of virtues such as wisdom, care, and creativity;
- deontological ethics: emphasizes adherence to universal rules and the importance of duty;
- consequentialist ethics: evaluates the moral worth of actions based on their outcomes;
- contract ethics: involves establishing ethical principles through a hypothetical social contract;
- care ethics: prioritizes human dignity and relationships;
- existential ethics: Emphasizes individual freedom and responsibility.

This list is by no means exhaustive, as numerous variations remain possible. However, in our research we are focusing specifically on these traditions.

These lenses provide a structured approach to ethical decision making, allowing designers to consider the broader implications of their work while maintaining a focus on creativity and innovation. They can be integrated in templates the same way as the other tools and techniques used in the framework.

3.3. Calibrating the Lenses

As sketched in section 2.3., in the preparation phase of the first diamond, the ethical aspects will need to be weighed against the culture, values, beliefs and ethical practices of the design team. As ethics is not something eternal and universal, these can differ substantially between different teams and even within teams over time. What a team considers ethical enough to begin investigating using a creative pipeline is something that is beyond the scope of our research. Our research focuses on the phases once the team has accepted the challenge.

In the preparation phase of each diamond a “full spectrum” ethical analysis is required. No specific lens is being used in this context, although one could argue that we are using all lenses at the same time.

We propose using a simple accounting and balancing methodology at this stage. To facilitate this procedure, we provide a multi-capital matrix that takes 9 capitals divided between 3 larger domains into account. This multi-capital matrix is inspired by the writings of Bill Baue (2020) who is working on a comprehensive new economic framework that takes a broader approach than the current economic system (*R3.0 | Redesign for Resilience & Regeneration for a Green, Inclusive and Open Economy*, n.d.). The MultiCapital Scorecard is a concrete implementation of this framework (McElroy & Thomas, 2015).

The capitals we have chosen to use are:

- Human:
    - Social
    - Intellectual

    - Psychological
- Economic:
    - Produced goods
    - Financial
    - Primary resources (land, raw materials)
- Natural:
    - Biosphere
    - Environment based (human habitat)
    - Physical (health related)

For each of these capitals an estimation is made of costs and profits associated with them on three levels:

- micro: concerning the client as an entity (which can be a person, business or organization);
- meso: related to the direct network of the client (customers, suppliers, relations, family, etc.);
- macro: taking the whole network into account that experiences an impact of the resulting product of service being realized through the creative process.

This leads to an example matrix, as illustrated in Figure 4. The numbers presented are purely illustrative. The specific procedure on how to score positive or negative effects should be determined based on the context of each project or within the context of a specific company or organization.

Multi-capital matrix																	
Human capital						Economic capital						Natural capital					
Psychological		Social		Intellectual		Produced goods		Financial		Primary resources		Biosphere		Human environment		Physical	
+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0
3		3		3		3		3		3		3		3		3	
1	2	5	1	5	1	5	1	5	0	1	1	1	2	3	2	2	1
-1		4		4		4		5		0		-1		1		1	
2	0	4	1	5	2	3	2	0	1	2	3	4	2	0	1	1	1
2		3		3		1		-1		-1		2		-1		0	

Figure 4: An example multi-capital matrix

This procedure should not be considered a bookkeeping procedure. The main intention of using this methodology is to consider where the main struggle points will be. Using this format stimulates a discussion between a chosen subset of stakeholders over a broad range of values that are generally important for human well-being. Based on this assessment the team can see where the most pressing issues could be to consider in more detail during the execution of the creative process. Those matrix cells where costs outweigh the benefits, might deserve more scrutiny using appropriate ethical lenses during the zooming in and out moments of the project.

These preparation phases provide the skeleton for all other ethical reflection moments. At these crucial points in the project the participants need to assess what ethical lenses are most valuable in the context of each specific project and what values within the chosen lenses have priority, taking all relevant stakeholders into account.

3.4. Zooming In and Out

"Zooming in" involves examining the rationale and value of specific AI tools or its results at a detailed level. This process includes evaluating the ethical implications of using particular tools, considering their impact on the design team, and assessing their alignment with the project's goals. For example, when using a generative AI tool for brainstorming, designers might consider whether the tool promotes creativity and

empathy within the team (virtue ethics) or whether it adheres to ethical standards (deontological ethics).

"Zooming out" involves evaluating the broader implications of AI tools at crucial transition points in the regular design process. This includes considering the societal (Van Maanen, 2022; Verdegem, 2022) and environmental impact (Crawford, 2021) of the tools, as well as their alignment with the organization's ethical values (Klingefjord et al., 2024). For instance, when transitioning from the Discover to the Define phase, designers might reflect on whether the AI tools used in the Discover phase have promoted inclusivity and accessibility (contract ethics) or whether they have considered the long-term societal impacts of their designs (consequentialist ethics).

3.5. The basic ethical building block

The basic ethical building block is a template to be used in the constructed pipeline at crucial points in the flow. The parameters mentioned in the following lists need to be determined in the preparation phase and should be fitting for the logical structure of the whole process.

Each ethical building block has the following properties and components:

- a number of state indicators chosen during the preparation phase intended to guide the AI based reflection context:
    - direction: post, pre or double;
    - stage: prepare, discover, define, develop, deliver, synthesize;
    - zooming state: in, out;
    - main capital: one of the 3 capital domains or 9 capitals;
    - lens (non-exhaustive): Virtue, Consequentialist, Deontological, Care, Contract, Existential, ...
- several interconnected components guiding the ethical reflection procedure (described in the flowchart in Figure 5):
    - a field to describe or summarize the conclusions from the previous building block (only at the start of this sub-process mutating to read-only once started);
    - a field to describe the next building block (only at the start of this sub-process mutating to read-only once started);
    - a button (or step if performed manually) to generate a reflection question related to all parameters given and the results and/or descriptions of the previous and next building blocks;
    - the output generated by the generative AI tool;
    - a field to describe the conclusion(s) from the ensuing discussion (to be filled in after the discussion phase);
    - a button (or step if performed manually) to generate reflective feedback;
    - a choice to continue to the next building block, remain in the same building block given additional discussion result input or return to a previous building block effectively iterating.

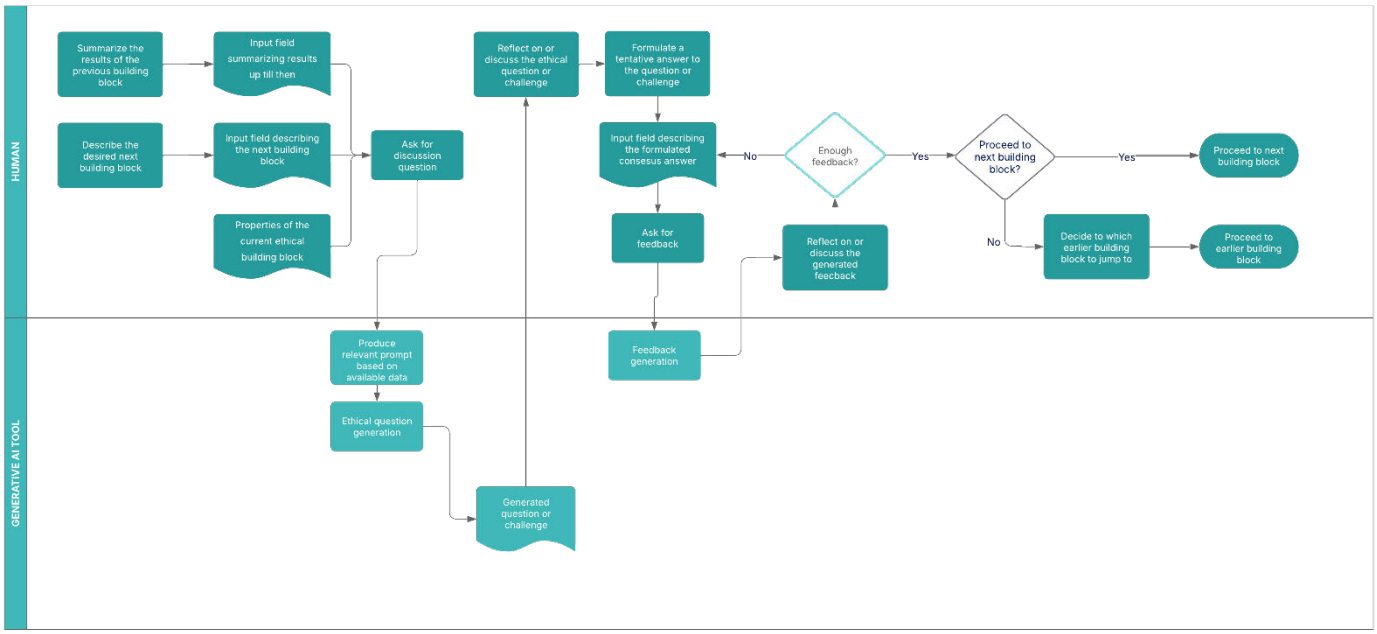

Figure 5: Ethical building block procedure

Starting with the summary of the results of the previous building block and describing what the next building block will be, combined with the properties of the prepared ethical lens, results in a prompt for a generative AI tool of choice. This tool generates an ethical discussion proposal (be it a question or challenge) for the team that discusses the topic and formulates a summary of the findings of this discussion. Feedback on this summary is asked of the generative AI tool. This results in a loop where the team needs to decide to continue discussing or proceed to the following phase. In principle, the AI component could be replaced by an ethical professional or the conductor mentioned earlier, however this would beat the purpose of enriching the process of an AI augmented double diamond. The added value of the fundamentally different AI intelligence is an important component of the whole concept.

The main purpose of integrating these ethical building blocks in the creative process is to open new perspectives. One of the side effects might be a slowing down of the process to reach the end result. This is not necessarily a negative thing. Viewing AI as a form of efficiency enhancing automation and rushing to an end result is one of the risks of using AI components (Reigeluth, 2023). When thinking only in terms of financial and human resource gains is the wrong way to use the benefits of using artificial intelligence tools. Using the created gains to produce richer end results is the only way to really profit from the huge opportunities these AI tools provide.

3.6. Fitting Building Blocks in the Modular Design

As mentioned in section 3.2. the lenses and techniques will be implemented using the same kind of templates as the other building blocks within the creative pipeline. Where they need to be placed, how many and what specific lenses will be used is the primary task of the coordinating sub-team or the conductor in one of the preparation phases, possibly using feedback from the synthesizing phases when available.

4. Current Results and Future Work

Initial testing of the methodology without the ethical lenses has been conducted with student groups in creative curricula and select companies from the three target domains.

The results indicate that the concept of using a mixed human-AI method enhances the creative process which confirms some of the findings in the literature (Wu et al., 2021). Ethical aspects up till now where only introduced ad hoc. No automation was used. The fact that ethical components were used was considered an important added value. Participants reported that the "zooming" methodology helped them to consider the specific as well as the broader implications of their work, leading to more ethically informed design choices.

Comprehensive testing using a (semi-)automated ethics building block integrated in the fully augmented double diamond flow, is planned for completion by June 2025. Several student groups will be testing a project workflow as illustrated in Figure 6. They will take on a creative challenge from the three application domains mentioned in the introduction: digital design, industrial product design, and marketing/communication.

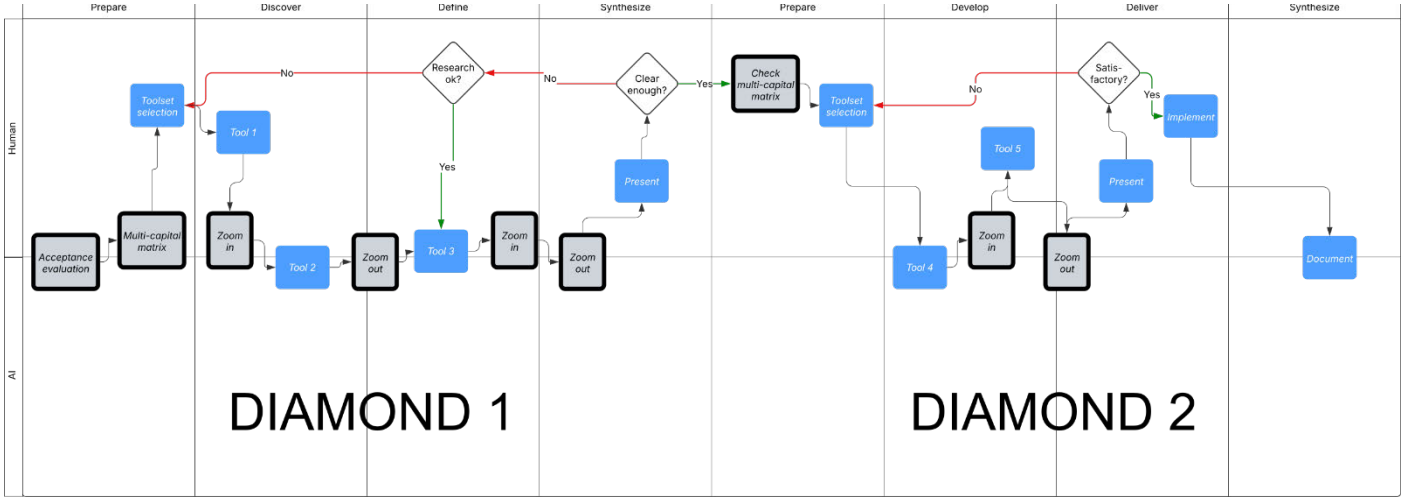

Figure 6: Example project flow

The testing process will begin with a preliminary calibration phase, as described in section 3.3. Teams will define the scope of their project, select relevant AI tools, and establish the ethical parameters using the multi-capital matrix. This initial step ensures alignment between the project's goals and the ethical constraints guiding decision-making. This step will be guided by an experienced instructor.

Once calibration is completed, participants will go through a controlled application phase, where they will execute the standard double diamond process while systematically integrating AI-generated ethical prompts at predefined moments. At each critical stage—Discover, Define, Develop, and Deliver—teams will be required to document their use of ethical lenses, assess the impact of AI interventions, and reflect on the decision-making adjustments influenced by these ethical considerations.

To capture variations in real-world applications, the testing will require the intermittent use of AI enhanced ethical lenses and ad hoc ethical procedures. Comparing both implementation within each team will help determine whether structured and AI supported ethical interventions lead to more responsible and innovative outcomes without hindering creativity.

Additionally, an iterative feedback loop will be incorporated, allowing participants to refine their approach based on intermediate evaluations. This will be facilitated through structured synthesis sessions, where teams will review AI-generated reflections, discuss the alignment of their work with ethical priorities, and adapt their methodologies accordingly.

The evaluation of the testing phase will be conducted through a multi-dimensional assessment framework that includes qualitative and quantitative metrics.

Qualitative data will be collected through structured interviews, focus group discussions, and design diaries maintained by participants. These will provide insights into how designers perceived the impact of ethical lenses on their workflow, creativity, and decision-making.

Quantitative evaluation will involve a combination of efficiency metrics, such as time spent on ethical reflection phases, and impact measurements, including shifts in design choices, changes in AI-tool reliance, and stakeholder assessments of final project outcomes. Surveys and scoring rubrics will be developed to systematically measure improvements in ethical awareness, decision-making quality, and design innovation.

A key component of the evaluation will be external validation, where final design outputs will be assessed by independent panels composed of domain experts, ethical scholars, and target users from the respective industries. This will provide an unbiased assessment of whether the integration of ethical lenses led to more ethically sound and functionally effective creative solutions.

5. Conclusion

This research addresses a critical gap in current AI ethics discourse by moving beyond abstract principles to provide an actionable framework for creative professionals. By integrating ethical lenses into the double diamond design methodology, we demonstrate how ethical considerations can be seamlessly embedded into existing design processes, ultimately enhancing rather than constraining creativity.

The proposed approach represents a significant advancement in responsible AI integration, offering a nuanced alternative to both uncritical AI adoption and overly restrictive ethical constraints. By treating ethical considerations as dynamic, contextual building blocks within the creative process, we create a more adaptive and responsive approach to technological innovation. This aligns with recent discourse advocating for the integration of AI ethics into practical design workflows (Bleher & Braun, 2023; Georgieva et al., 2022).

Key contributions of this research include:

- a modular ethical framework that allows for flexible, context-specific ethical reflection, leveraging ethical theories from virtue ethics to consequentialism (Vallor, 2016; Wright, 2022);
- a systematic approach to "zooming in and out", enabling designers to consider both micro and macro ethical implications at various stages of the creative process, inspired by methodologies that promote iterative ethical engagement (Steen, 2023; Munn, 2023)
- a multi-capital assessment methodology that broadens the evaluation of creative projects beyond traditional economic metrics, incorporating environmental, social, and intellectual capital as key components (Baue, 2020; McElroy & Thomas, 2015).

The methodology we propose goes beyond mere compliance, positioning ethics as a

generative force that can spark innovation rather than a set of restrictive guidelines. Prior research has shown that constraints can act as catalysts for creativity rather than limitations (Rosso, 2014; Boden, 1998), and our framework builds on this insight by embedding ethics as an integral part of creative ideation. By encouraging designers to engage deeply with ethical considerations through AI-assisted reflection, we open new pathways for more thoughtful and socially responsible creative work.

Moving forward, our comprehensive testing planned for June 2025 will provide crucial empirical validation of this approach. By systematically analyzing the impact of ethical lenses within real-world design challenges, we anticipate refining the framework for broader adoption. Findings from this testing phase will also contribute to ongoing discussions on AI's role as a collaborative design partner, reinforcing perspectives that emphasize the augmentation of human creativity rather than its replacement (Eapen et al., 2023; Liu & Nah, 2020).

Ultimately, this research underscores the potential for AI to be a collaborative partner in ethical innovation—one that amplifies human creativity while maintaining a robust commitment to fundamental moral principles (Dignum, 2019; Klingefjord et al., 2024). As generative AI continues to transform creative industries, frameworks like the one presented here will be essential in ensuring that technological advancement remains aligned with human values and societal well-being (Crawford, 2021; Van Maanen, 2022).

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INVESTIGATING VIDEO GAME HARASSMENT THROUGH DESIGN RESEARCH: THE PROCESS OF MAKING A BRAIDED COMIC THROUGH CREATIVE INQUIRY

Elizabeth Hejny

ABSTRACT | *Git Gud: A Braided Comic About the Good, Bad, and Ugly in the Video Games Community* (2024) is a creative inquiry into presenting research in a braided comic format. Comics-based research refers to a broad set of practices that use the comics form to collect, analyze, and disseminate scholarly research. The unique design aspects of this project include the creation of a braided comic about harassment in video games, which adapts the principles of a braided essay into a visual braid of three strands: a narrative short story, research on harassment in video games, and my autoethnographic experiences with harassment as a video game player. When your research is investigating a wicked design problem, focusing on one small piece is not enough, and the many elements seem tangled and intertwined, like a bad hair day, braiding together the strands can add order to the many overlapping components. This session will review the development of the braided comic as a format to present these three strands of harassment in video games. The session presentation will overview the process of creating this research-informed comic and reflections on creative inquiry and design discoveries from working within this comic-making process for researching complex problem spaces in digital human interactions. Then this session will review of the affordances of this process, such as novel connections and increased visual communication are included in this paper, the discovered downsides to braided comics in design research, and practical recommendations for how to integrate comics-based research for others interested in adopting this format effectively. The session will conclude with suggestions and advice for how this format can be applied to broader research contexts and how design researchers

and educators can incorporate braided comics or other fluid research methods within their own work.

KEYWORDS | COMICS, CREATIVE INQUIRY, ONLINE HARASSMENT, VIDEO GAMES, BRAIDED

1. Introduction

"Git Gud" is a slang expression in the video game community. "Git Gud" is an intentional misspelling of the phrase "get good" and is used to heckle inexperienced players or 'newbies' in online video games. I use the slang 'Git Gud' in the title of my project, Git Gud: A braided Comic about the Good, Bad, and Ugly in the Video Games Community (2024), because I think there is an opportunity to reconsider the term from the perspective of my research. What if 'Git Gud' was a phrase that encouraged other players to be kind or good to each other? To an experienced video game player, that suggestion might sound laughable. However, encouraging good or sportsmanlike behavior of players is a good design strategy for many video game designers. In a world where players set a priority to strive to 'Git Gud' by leveling up their collaboration and sportsmanship skills, the toxicity associated with the video game community would likely be reduced.

However, 'Gitting Gud' is also a moving target because defining 'good' and 'bad' is subjective to each player. Defining negative behavior in the video game community is complicated and filled with overlapping terms and perspective-based nuance.

When approaching negative interactions in video games from a design research perspective, more investigation into the problem space resulted in a recognition that a clear understanding of all the overlapping elements was a part of the problem itself.

The primary research utilized for this process involved the project-based 'research through art and design' (Frayling, 1993) process. Research through design in human and computer interaction (HCI) involves reflection in iteratively understanding the people, problem, and context around a situation that researchers feel they can improve (Zimmerman & Forlizzi, 2014). Comics-based research (CBR) has emerged across the sciences and humanities. CBR refers to a broad set of practices that use the comic form to collect, analyze, and disseminate scholarly research (Kuttner et al., 2020). Using research through art and design and project-based research, a braided comic format was utilized to capture, translate, and present the results of video game harassment and bullying design research findings, which include the investigation of anonymity online, the emotional impact on victims of harassment, players' relationships to their avatars, perspectives on trash talk, and depicting interactivity online. This project also heavily utilized creative inquiry, which is the ability to generate new and alternative ways of addressing problems, answering questions, or expressing meaning in the pursuit of learning (Joubert, 2022). Creative inquiry is a problem-solving process combining various ideation strategies with targeted research and purposeful critical thinking (Steward, 2021). It emphasizes the development of questions compared to formal research focused precision, organization, and efficiency (Holland, 2017). Uniting creating inquiry and research through art and design, this project investigates how the video game community can strive to 'Git Gud.'

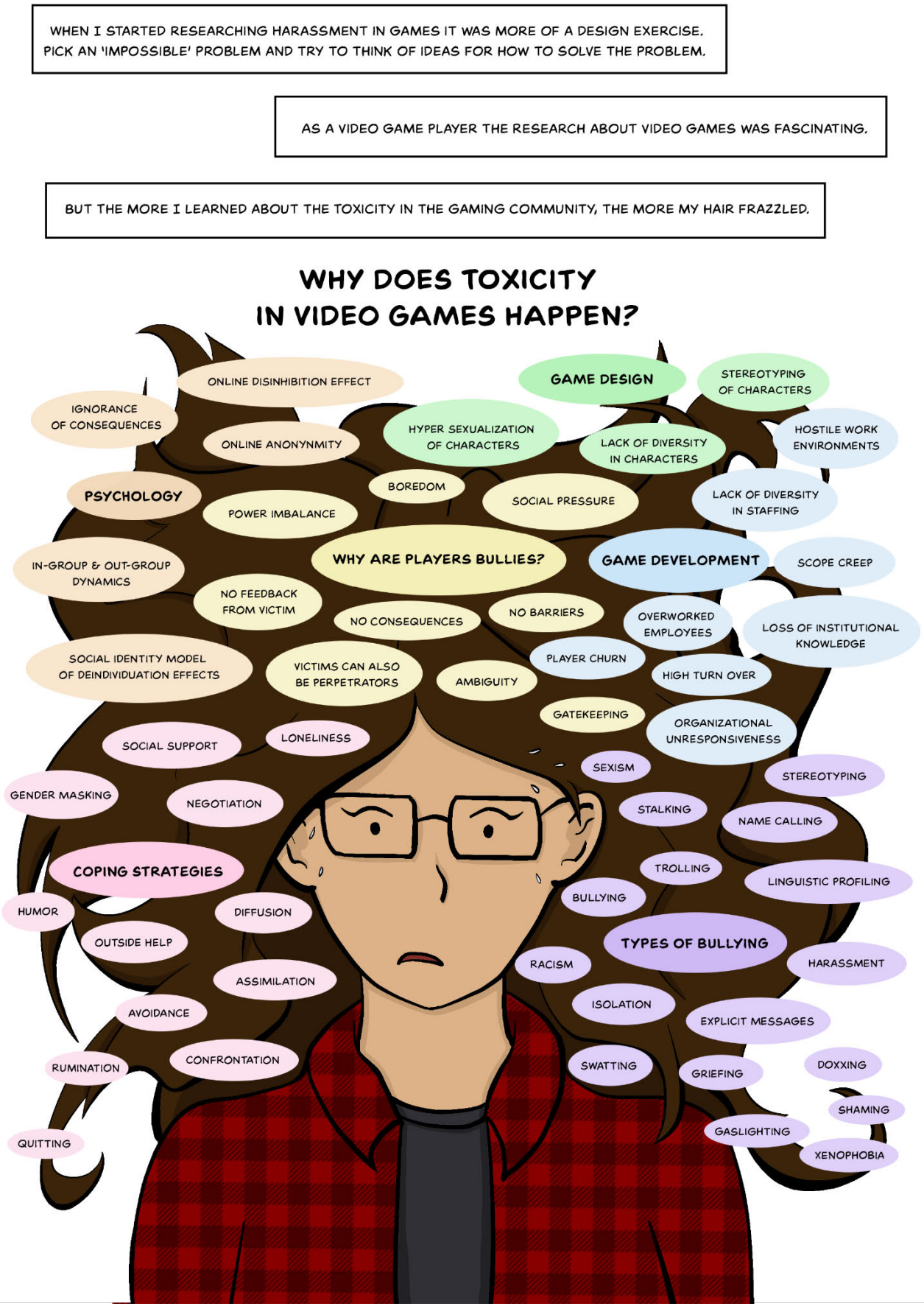

Figure 1. Page 5 of *Git Gud: A Braided Comic About the Good, Bad, and Ugly in the Video Games Community* (2024)

Figure 1. Page 6 of *Git Gud: A Braided Comic About the Good, Bad, and Ugly in the Video Games Community* (2024)

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Limited Sharing and Bottom-Line Safeguarding: Ethical Design Knowledge Flow in Chaos and Game

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ABSTRACT | In the digital and knowledge economies, the challenge of sharing and safeguarding design knowledge has emerged as a significant societal issue(Luchs et al., 2016; Yang et al., 2022). Open communities advocate for collective intelligence and innovation through the sharing of design insights, while many profit-driven individuals and businesses prioritize safeguarding their original designs to maintain a competitive edge. This conflict complicates knowledge management(Benabdellah et al., 2024; Oygür, 2018) particularly given the lack of effective mechanisms for regulating knowledge sharing and safeguarding individual rights.

To address this challenge, an ethical framework is introduced for managing design knowledge flow, integrating chaos theory and game theory to balance knowledge sharing with individual rights in design communities. Initially, leveraging chaos theory, the unpredictable behavior of design knowledge dissemination is explored in complex digital environments. Critical variables impacting knowledge flow are identified, and strategies to mitigate uncertainties and risks are proposed, enhancing flow efficiency(Zhuge, 2006). Next, game theory is applied to examine the interests of designers and users in shared knowledge environments. By simulating interactions on design platforms, strategic decisions made by both parties are quantified, considering factors like copyright safeguarding and user willingness to pay, to assess how different sharing approaches impact safeguarding and collaboration. Finally, the status quo of different design community platforms are analyzed, the closed-loop design knowledge ecosystem of creation, dissemination and feedback is explored, and the current strategies for sharing and protection of the platform are reviewed.

The study shows that the integrated strategy based on chaos theory and game theory can achieve a balance between knowledge sharing and individual rights safeguarding. Designers can ensure the safe sharing of their works on an open platform through a

reasonable copyright safeguarding mechanism, while users can access and use these works in a standardized framework, resulting in a win-win situation. The study also verifies that the introduction of copyright safeguarding measures and terms of use significantly reduces the risk of copyright infringement and enhances designers' motivation to participate in open sharing environments.

The findings offer valuable knowledge management strategies for the design industry and other knowledge-intensive fields, providing theoretical foundations for balancing knowledge sharing and safeguarding in the digital age.

KEYWORDS | Design ethics, Design knowledge, Sharing and Safeguarding, Chaos theory, Game theory

1. Introduction

Knowledge is a kind of social resource, it needs to go through production, transformation, creation, application and other stages to achieve its maximum value. The knowledge economy's power makes knowledge an important source of social assets and competitive advantages, but its value depends on its effective flow and communication in society. From the perspective of content form, the flow of design knowledge is a process of observation and transformation from data, information, knowledge and intelligence to wisdom(DIKIW). This Knowledge flow of the DIKIW refers to the chain link of knowledge application(Liew, 2013). From the perspective of time and space, the concept of dynamic knowledge introduces flowing. This kind of flow promotes the optional docking with knowledge sources in specific knowledge application scenarios and leads to the connection between specific knowledge users and knowledge providers(Holtshouse, 1998). It is the concern of knowledge economy, design knowledge flow and design collaborative innovation that has become an indispensable part of design knowledge management research.

In the era of knowledge explosion, the value of knowledge is no longer only embodied in independent accumulation but can realize full and effective circulation and collaborative sharing in society. Therefore, optimizing the benefit of knowledge dissemination has become the core issue, which is embodied in the emergence of community knowledge, the wisdom sharing of group knowledge and the original declaration of individual knowledge. Knowledge sharing and safeguarding are considered important issues in knowledge management research. However, the design itself is a collaborative innovation process, including interdisciplinary, cross-department and cross-organization cooperation and collaboration among heterogeneous organizations, that is, it has the attribute of flow communication. As the essential core of collaborative innovation, the flow and dissemination of design knowledge is the sharing of private or shared knowledge among heterogeneous subjects, thus forming a collaborative interaction process of knowledge creation and value spillover. Therefore, the dissemination of design knowledge involves the diversity of heterogeneous subjects, the diversification of interests, and the multidimensional attributes of knowledge. The development of a digital design knowledge community will be influenced by the particularity of design knowledge and the flow characteristics of interdisciplinary and cross-organization.

The existence and dynamic change of the knowledge community is an important mechanism to promote knowledge innovation and evolution. Designers represented by

design knowledge groups generally believe that designers are the source of work knowledge, as well as the expression and transmission of knowledge. Designers through continuous learning and mastering of new design concepts and technical means, that is, to acquire new design knowledge, to promote the innovation and development of design. In this process, the practical experience and creative inspiration of designers inject new vitality into the knowledge network and promote the renewal and evolution of knowledge. The process of designers publishing works on the design platform, on the one hand, is the process of showing the transformation of knowledge into creative works, which involves the safeguarding of their original knowledge; On the other hand, the open platform is used to improve its influence, hoping to get a high degree of attention and widespread. Community group refers to the knowledge disseminators and receivers in the design platform, such as professional designers, amateur design enthusiasts and ordinary browsing users. The design of knowledge network evolution rules shows that community groups have an active role in promoting the evolution of knowledge networks and show non-uniform distribution. Although the contribution of a single community group to the Knowledge network is concentrated in a specific domain or period, that is, the views of some design knowledge emerge. While for the overall design platform, cross-domain cooperation and knowledge sharing need to be encouraged to maintain long-term activity and diversity, that is, the Knowledge Ecosystem of massive design works(Paavola et al., 2004; Zhang et al., 2009). However, either side of the community is a participant in the knowledge flow of community open innovation design, and all face the moral and ethical question of knowledge sharing or safeguarding.

Based on this, the tradeoff between knowledge sharing and property safeguarding in the design community is the tragedy of the commons. As a result, the digital design community is caught in a catatonic dilemma of limited sharing and bottom-line safeguarding. This contradiction highlights the invalidity of traditional knowledge management theories. A dynamic theory of organizational knowledge creation based on the linear propagation hypothesis makes it difficult to explain the cascading effect caused by the secondary creation of community groups(Nonaka, 1994). Therefore, ethical design knowledge flow is crucial, as shown in the **figure 1**.

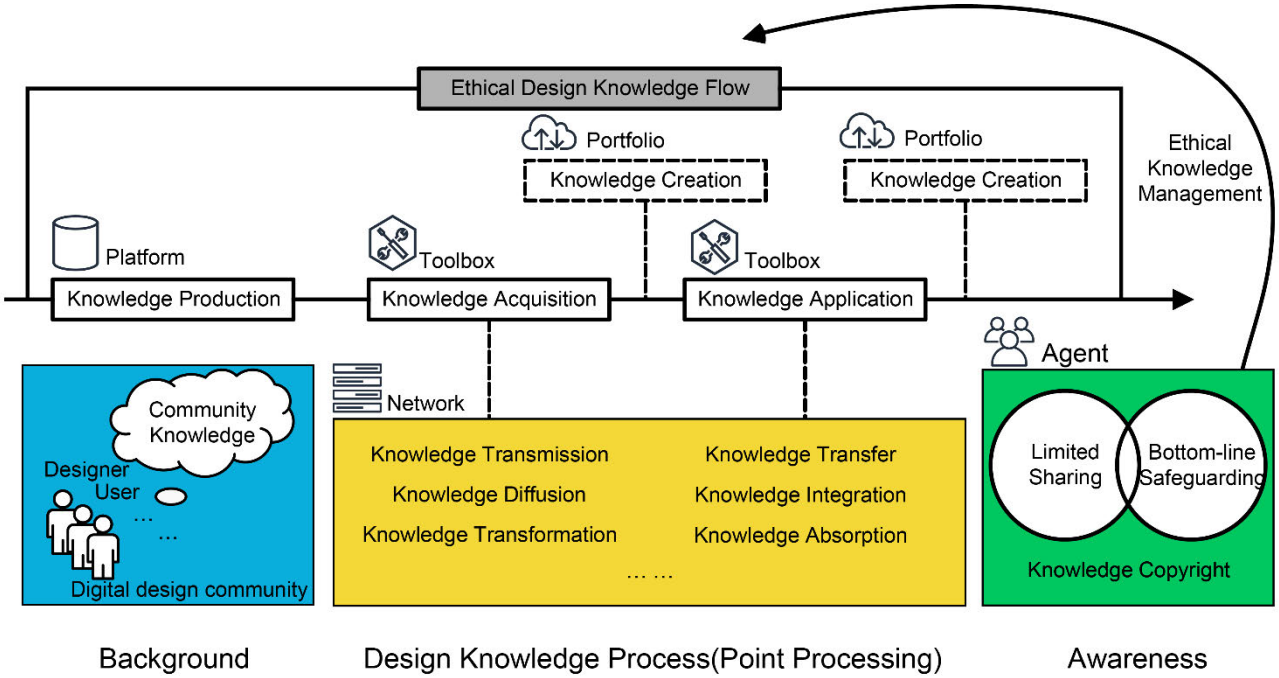

Figure 1. Ethical Design Knowledge Flow by Considering Limited Sharing and Bottom-Line Safeguarding.

2. Knowledge Management for Sharing and Safeguarding

2.1 Knowledge sharing

The characteristics of knowledge such as replicability, propagation and transferability determine knowledge sharing. Knowledge sharing is a process of spreading and sharing through information media, in which knowledge receivers expend new knowledge or interact with each other through known knowledge, thereby improving the value of knowledge utilization and expanding the effect of knowledge economy(Wijnhoven, 1998). Considering knowledge ontology in the description of Knowledge sharing, knowledge trading is the basis of knowledge sharing, knowledge transfer is the process of knowledge sharing, organizational learning is the means of knowledge sharing, and knowledge creation is the purpose of knowledge sharing(Wang & Noe, 2010). Specifically, from the perspective of market transaction, knowledge sharing is regarded as a valuable commodity, and participation in the transaction of the knowledge market will bring the improvement of knowledge output. From the perspective of information communication, knowledge sharing refers to the process of knowledge transfer between people, that is, the process of communication between people; From the perspective of organizational learning, knowledge sharing can be understood as the transfer of knowledge among organization members to achieve the common ownership of individual knowledge by the organization. From the perspective of systems engineering, knowledge sharing is the result of many factors.

Collective Intelligence is the aggregation of available knowledge into common models that facilitate the design knowledge flow(Suran et al., 2020). Previous studies have studied the problem of sharing from the perspective of different attributes of knowledge. But they have not considered the changes in the connotation and extension of knowledge attributes given by the increasingly sound intellectual property safeguarding law, which has brought about the chaos of attribute characteristics and the game related to interests and cannot further promote the efficient management of knowledge.

2.2 Knowledge safeguarding

From the perspective of intellectual property rights, the process of knowledge sharing is the process of acquiring, transferring and sharing knowledge about product innovation in the form of property rights safeguarding.

Knowledge sharing mechanism can be divided into incentive mechanism and constraint mechanism. Specifically, the incentive mechanism runs through the whole process of knowledge sharing to determine the state of entering and exiting the sharing evaluates the results and distributes the benefits according to the will of the subject, while the constraint mechanism is to safeguard the rights and interests of heterogeneous subjects, and the law and morality provide the most basic guarantee of trust level(Bhaskaran & Krishnan, 2009). The incentive mechanism under the network knowledge economy is the rightness of property rights based on the theory of labor property(Cwik, 2014) and personality right(Hughes, 1998), while the restraint mechanism is a series of measures for digital copyright, a technology patent and digital trademark and anti-unfair competition.

Due to the expansion of the scope of knowledge safeguarding and the ambiguity of safeguarding rules, the “creative commons license” was proposed(Kim, 2007), which is a mechanism for the licensing of intellectual property linked through the World Wide Web.

The principle is that a modest “selective retention of rights” replaces the default “retention of title”. Under the framework of the platform's sharing agreement, platform users are allowed to use the design creative results free of charge with the declaration of necessity and selective restrictions. The declaration and conditions of the copyright sharing agreement framework include disclosure of identity, non-commercial use, non-secondary creation, and restricted dissemination and sharing(McGuirk, 2008). However, the degree of openness and limitation of design knowledge has not been clearly defined, and more generally, the platform's preconceived safeguarding scope is defined.

3. Ethical Design Knowledge Flow in Chaos and Game

3.1 Knowledge Flow in Ethical Design from Chaotic Systems Perspective

Under the macro point, the dynamic factors of a chaotic system can be divided into the trust mechanism of community cooperation and the legal constraints of platform supervision.

Trust mechanism of community cooperation is the positive driving force. The starting point of inter-group trust is community cooperation activities, and it is the interaction and cooperation between groups or individuals that form complex and close social relations. In community organizations, the important role of subject trust is especially reflected in the trust between heterogeneous subjects can affect and decide their transaction behavior. Examples encompass crowdsourced design that facilitates collaboration, parallel design that reduces transaction costs, and collaborative design that connects partners and focuses on the task itself. Mutual trust between the entities will also improve the overall operation efficiency of the system organization, make cooperation between the entities smoother, and reduce the total transaction cost. Therefore, in the process of knowledge sharing, the inter-subject trust mechanism will become the driving factor in the process of knowledge flow.

The legal constraints of platform supervision are both positive and negative driving forces. Platform supervision based on intellectual property rights is the process of applying and obtaining intellectual property rights from design knowledge innovation generated in the process of using the platform. Therefore, intellectual property is an effective way to motivate the intellectual labor achievements of the subject in platform supervision. From the perspective of legal attributes, the ownership of intellectual property rights includes rights such as possession, use, disposition and income, and the economic benefits of the content of rights are generated from the multi-dimensional attributes of commodities. In the design of a knowledge platform based on the social network, knowledge-sharing behavior among subjects may lead to knowledge externalities, such as the loss risk of non-human knowledge spillover and human knowledge theft. Therefore, in the process of knowledge sharing, the safeguarding of rights within the subject will become the resistance factor in the process of knowledge flow.

From the perspective of legal attributes, the safeguarding of knowledge sharing can be categorized into two dimensions: legal exclusivity and public nature. The legal exclusivity granted to heterogeneous subject knowledge confers proprietary and monopoly rights to intellectual property rights holders, which may impede the realization of knowledge sharing. Legal exclusivity refers to the robust safeguarding of intellectual property rights for diverse entities, acting as an insulator to knowledge sharing. Conversely, the public nature of legal provisions for heterogeneous subject knowledge emphasizes the safeguarding of

fundamental rights and interests of rights holders, thereby encouraging the creation and design of new knowledge by safeguarding their interests rather than imposing absolute exclusivity. This promotion of public property facilitates the dissemination, transfer, diffusion, creation, and utilization of knowledge, fostering effective knowledge sharing. The public nature of law serves as a facilitator of intellectual property rights for diverse entities, the conductor of knowledge-sharing. Therefore, within a legally constrained environment, legal exclusivity and public nature coexist. Exclusivity provides localized potential energy to incentivize innovation, while public nature contributes to global entropy increase, promoting knowledge diffusion, thus forming a mutually beneficial relationship under platform supervision. Therefore, a dynamic factor model for design knowledge sharing can be obtained based on chaos theory, including the trust mechanism of community cooperation and the legal constraints of platform supervision, as shown in the **figure 2**.

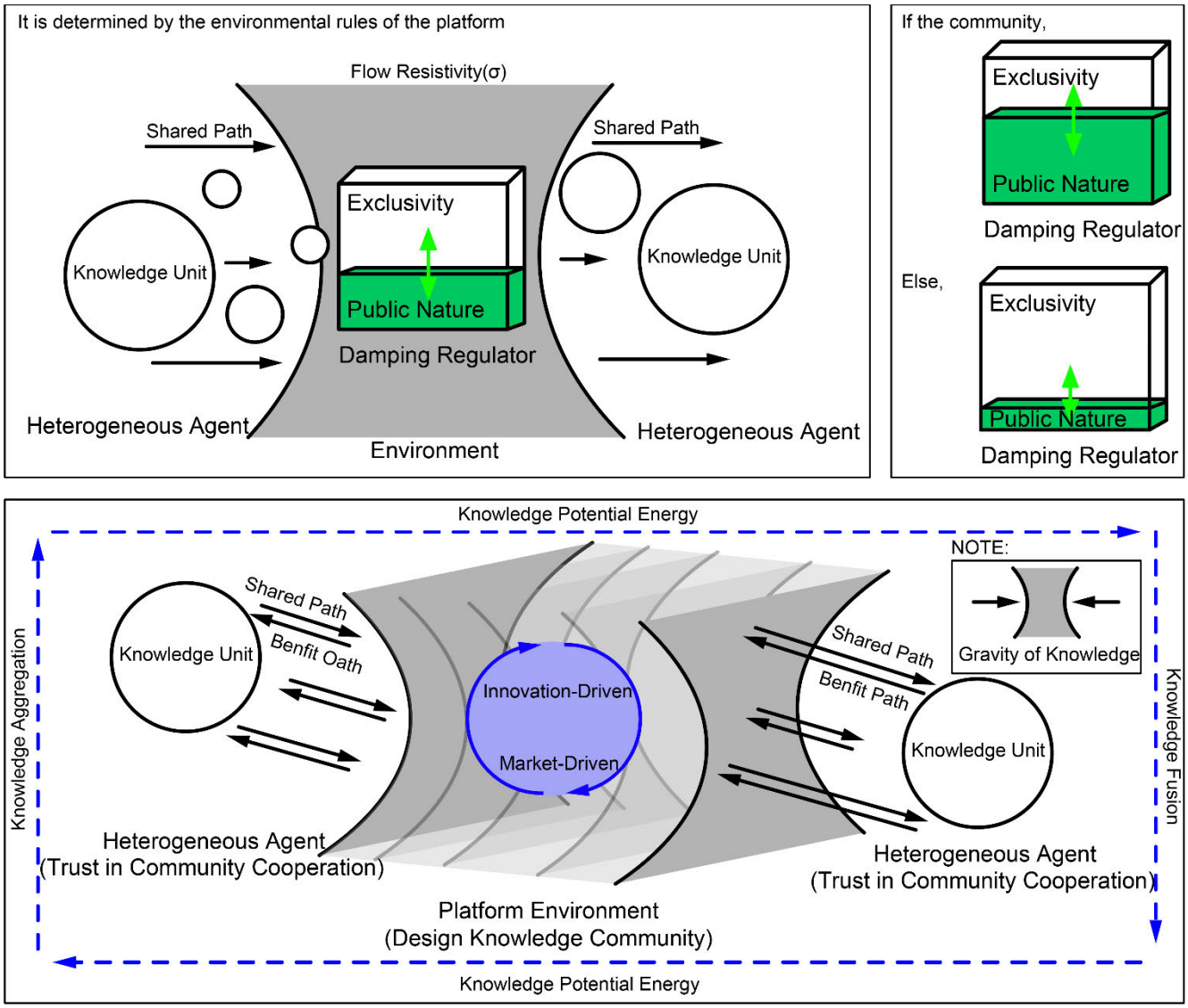

Figure 2. Knowledge Sharing from the Legal Perspective.

In figure 2, the design knowledge flow is compared to the flow of electrons in a dielectric, which has a dielectric constant (or flow resistivity) to control the flow speed, and it is influenced by the environment and its knowledge of gravity. Therefore, the intensity of safeguarding and promotion of the platform's intellectual property rights when sharing becomes a damping regulator in the execution environment. At the same time, the design knowledge community is driven by collaborative innovation and market interests, and due to the community cooperation and trust of the main body, the design knowledge is always driven by potential energy, and the exchange of design knowledge is completed in the

repeated aggregation and integration.

Under the meso point, the nonlinear dynamic equations of chaotic systems(Akhmet & Fen, 2015; Lorenz, 1963) can be constructed from the mutual perturbations among designers, community platforms and platform users. The dynamic mapping requires the construction of a three-dimensional variable system, which is detailed as follows.

- Designer creativity (X): Designers are the subject of innovation supply and knowledge sharing. Creativity (X) includes the rate of innovation (X1), the tendency to share knowledge (X2), and the ability to resist interference (X3). The rate of innovation (X1) is the efficiency with which designers generate new ideas, products, or solutions, and is influenced by individual capabilities (e.g., design knowledge understanding), collaborative tools (e.g., open-source knowledge transfer), and incentives (e.g., intellectual property revenue). Knowledge sharing orientation (X2) represents the willingness of designers to actively open knowledge (e.g., open-source knowledge protocols) or participate in community collaboration, shaped by cultural values (e.g., geekiness) and institutional design (e.g., copyright flexibility). Anti-interference capability (X3) represents the adaptability of designers to changes in platform policies (e.g., tightening of property rights) or sudden changes in user needs, relying on knowledge resource reserves and knowledge ecological stability (e.g., umbrella intellectual property rights).
- User behavior entropy (Y): Users are demand-driven and ecological feedback subjects. Behavioral entropy (Y) includes activity (Y1), heterogeneous demand (Y2), and feedback efficiency (Y3). Among them, activity (Y1) represents the frequency of user engagement with the platform (e.g., content likes, favorites, and reposts), driven by experience fluency (e.g., platform technology support) and value perception (e.g., personalized recommendations). Heterogeneous demand (Y2) represents the heterogeneous demand distribution of user groups, which determines the directional dispersion of designer innovation. Highly homogeneous requirements can lead to system rigidity (e.g., "high traffic recommendation" dependency). Feedback efficiency (Y3) is expressed as the rate at which user reviews, and data behaviors (e.g., secondary creations) are translated into designer-understandable signals, relying on algorithmic transparency (e.g., recommendation mechanism interpretability), and community communication channels.
- Platform rule flow (Z): The platform is the main body of rule-making and resource coordination. The platform rule flow (Z) includes governance intensity (Z1), technology empowerment level (Z2) and policy flexibility (Z3). Among them, governance intensity (Z1) represents the intensity of the platform's control over intellectual property safeguarding, content review and benefit distribution, which is reflected in the complexity of rules (e.g., copyright agreement terms) and implementation costs (e.g., investment in infringement monitoring algorithms). The technology enabling level (Z2) represents the infrastructure (e.g., API interfaces) and toolchain (such as collaborative editors) provided to the platform, which directly affects the efficiency of the designer's interaction with the user. Policy flexibility (Z3) refers to the ability of the platform rules to dynamically adjust to changes in the external environment (e.g., legal amendments) and internal imbalances (e.g., user loss). It needs to balance stability (avoiding frequent changes) and flexibility (responding quickly to crises).

Based on the above variable descriptions, the nonlinear dynamic equation can be roughly constructed, as shown in the **figure 3**.

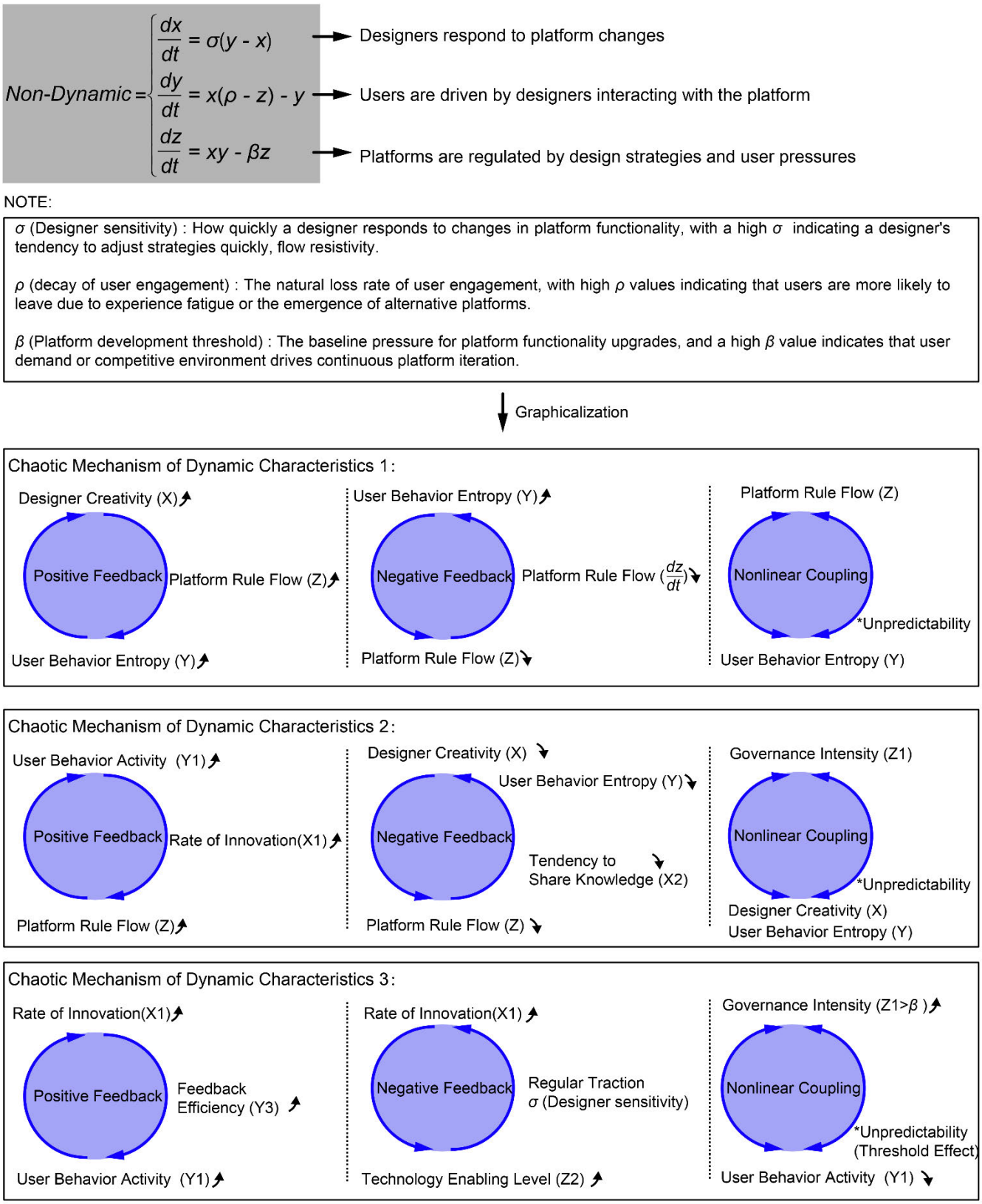

Figure 3. Nonlinear dynamic equations and dynamic characteristics of chaotic systems.

- Positive feedback mechanism. For example, user demand (Y) stimulates designer innovation through market signals (user ratings) (X1); Platform function optimization (Z) improves user experience (Y1) to attract more users to join; Designer-user collaborative innovation (XY) enhances platform attractiveness

(Z2), forming network effects; Developers in the open-source community (X1) iterate quickly on code through user feedback (Y3) to improve user retention (Y1)

- Negative feedback mechanism. For example, excessive platform control (Z) may inhibit knowledge sharing (X2), resulting in closed-source innovation; Designers over-catering to users (X2) can lead to innovation convergence and reduce long-term user interest (Y1); High-intensity governance (Z) may reduce user autonomy (trigger Y), which in turn weakens innovation supply (X).
- Nonlinear Coupling mechanism. For example, the random unpredictability of user behavior (X) and platform rules (Z) themselves; Users switch to competing products (Y1) due to the tightening of the platform's data privacy policy (Z1 exceeds the threshold ρ); Platform launches more open-source collaborative innovation tool (Z2), lowering the threshold for designers to innovate (X1)

Under the micro point, the phase space reconstruction and singular attractor establishment of chaotic systems need to further explore the time series of platform behavior, as shown in the **figure 4**.

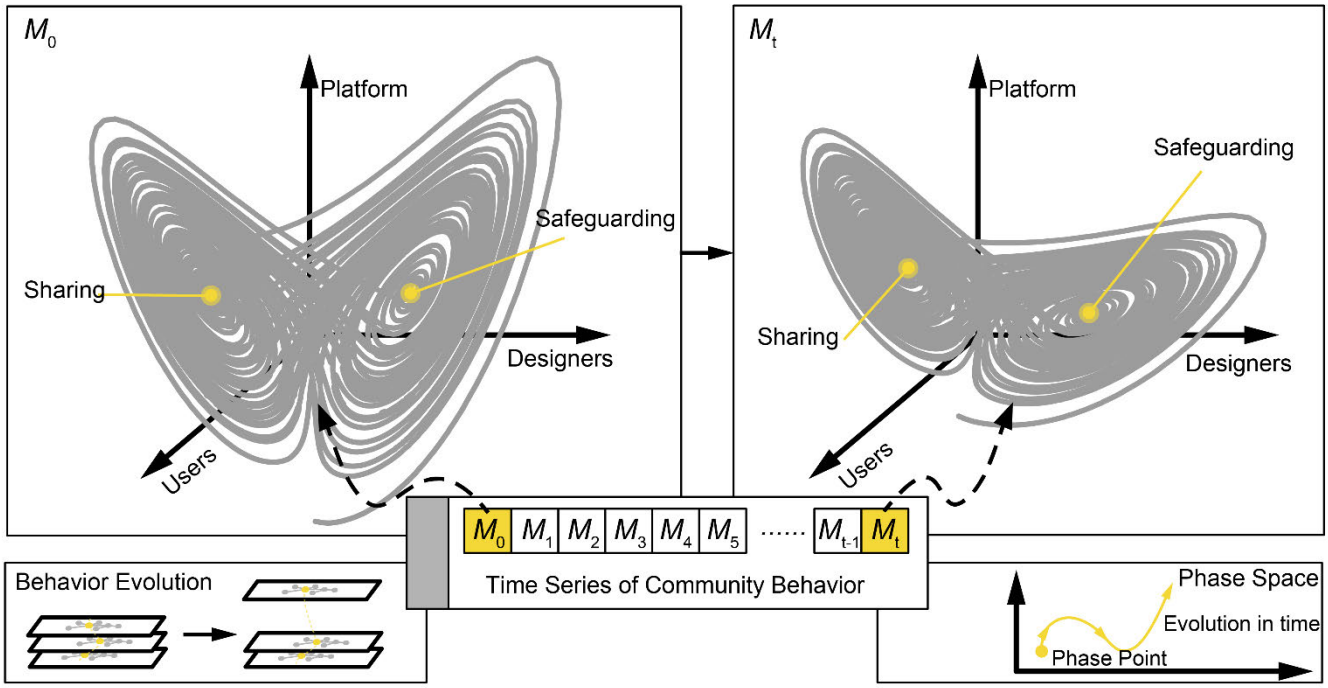

Figure 4. Lorentz Singular Attractor for Chaotic System, Source: (Sugihara et al., 2012).

Under the time series of the slices of the system layer, the sensitive points in the knowledge propagation process can be judged by calculating the Lyapunov index, and the nonlinear nature of the sensitive dependence of the knowledge propagation system on the initial conditions can be revealed quantitatively. At the same time, through the multi-dimensional reconstruction of phase space, an extended phase space model including knowledge diffusion rate, copyright constraint strength, innovation incentive factor and other multi-dimensional parameters can be constructed. The dynamic equilibrium region of the system in the parameter space can be identified by tracking the geometric evolution of the singular attractor, to achieve the game balance between copyright safeguarding strength and community creativity. In addition, the knowledge propagation network can be abstracted into a dynamically evolving weighted graph structure, the nodes of knowledge propagation agents and the edges of knowledge propagation probabilities can be explored, and the self-similarity of the network can be quantified by fractal dimension, to verify the self-similar diffusion path of design knowledge.

3.2 Knowledge Flow in Ethical Design from Dynamic Game Perspective

The Nash equilibrium analysis of a static game is a binary static game between the designer and the user. In the strategic space, the designer has the choice of knowledge sharing and knowledge safeguarding, while the user has the choice of free recreation and paid use, and the game relationship between the two is not completely opposite but has an evolutionary equilibrium state. Therefore, the payoff matrix of the designer's benefit and the user's benefit under the combination of platform strategies can be obtained. In this matrix, there are several adjustable parameters, such as knowledge original value, user base utility, copyright transaction cost, copyright infringement loss, theft revenue coefficient, sharing rate, and collaborative innovation gain. Currently, the solution of Nash equilibrium is about the pure strategy equilibrium and mixed strategy equilibrium. The pure strategy equilibrium is to determine the return equilibrium under the stable state condition by analyzing the dominant strategy. Mixed strategy equilibrium is to solve the spatial optimal probability distribution(Abedian et al., 2022). Since the analysis of static games often ignores the periodic decay of knowledge value and the imperfect rationality of instantaneous decisions, the strategy imitation of dynamic evolutionary games and the dynamic simulation of knowledge stock can be introduced.

The strategy imitation of the dynamic evolutionary games is to dynamically analyze the bounded rationality of the platform through the adjustment strategy of the participants' community behavior, that is, the platform strategy imitation mechanism with time series. At the same time, the participants' community behavior was heterogeneous. Designers' community behavior can be divided into professional (high knowledge stock) and amateur (low knowledge stock) design knowledge dissemination, while user behavior can be divided into commercial (high willingness to pay) and individual users (low willingness to pay) design knowledge acquisition. The solution of the Dynamic Equilibrium Point (DEP) is the Dynamic evolutionary game payoff matrix (Dynamical evolutionary games) based on chaos constraints. Currently, the combination of sharing and safeguarding strategies of the design platform forms the income combination of the designer and the user. Therefore, the replication dynamic equation can be constructed, and the derogation rate of design knowledge circulation in the platform can be properly included, which reflects the dynamic timeliness. A “reputation-discounted factor” can even be introduced to quantify long-term game effects(Tang et al., 2024).

The knowledge evolution dynamics model is a theoretical framework to understand how knowledge arises, spreads, evolves and dies over time(Malhotra & Majchrzak, 2022). Its core lies in revealing the dynamic change law of the knowledge system and its driving mechanism and specifically analyzing the interaction process of knowledge in different subjects, environments and social structures. The knowledge evolution dynamic coupling analysis of the platform can introduce the knowledge stock equation to represent the state variable, that is, the knowledge evolution equation. Among them, the regulating factors are the shared cooperation coefficient, knowledge attenuation coefficient and derivative innovation rate.

Evolutionary Stable Strategy (ESS) is a dynamic equation composed of a simultaneous replication dynamic equation and knowledge evolution equation for local stability analysis. At this time, the three-dimensional dynamic equation can be analyzed from the phase space of chaos theory, and the attractor domain and bifurcation condition can be identified(Hofbauer & Sigmund, 2003). Strategy solving involves the existence conditions of equilibrium points and local stability, such as exploring boundary equilibrium and internal saddle point equilibrium, and determining the eigenvalues of the Jacobian matrix, as shown in the figure 5.

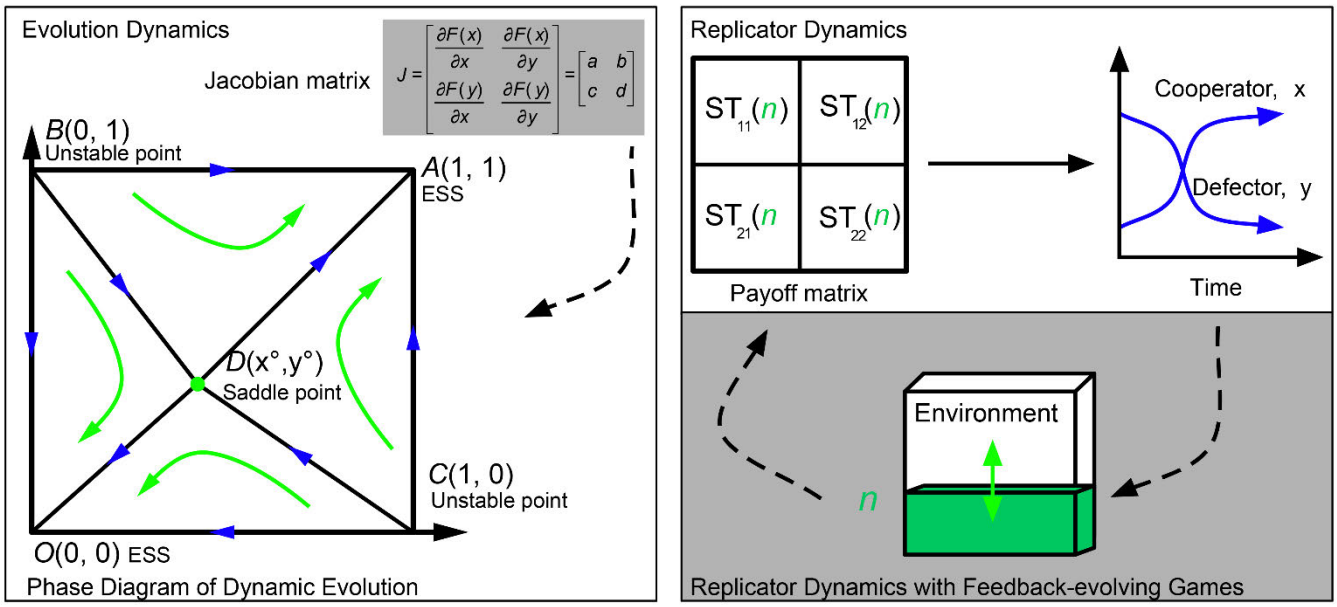

Figure 5. Coevolutionary Game Theory, Source: (Friedman, 1991; Weitz et al., 2016).

3.3 Ethical Design Knowledge Management Framework based on Chaos-Dynamic Game Coupling

An ethical design knowledge management framework can be proposed in **Figure 6**.

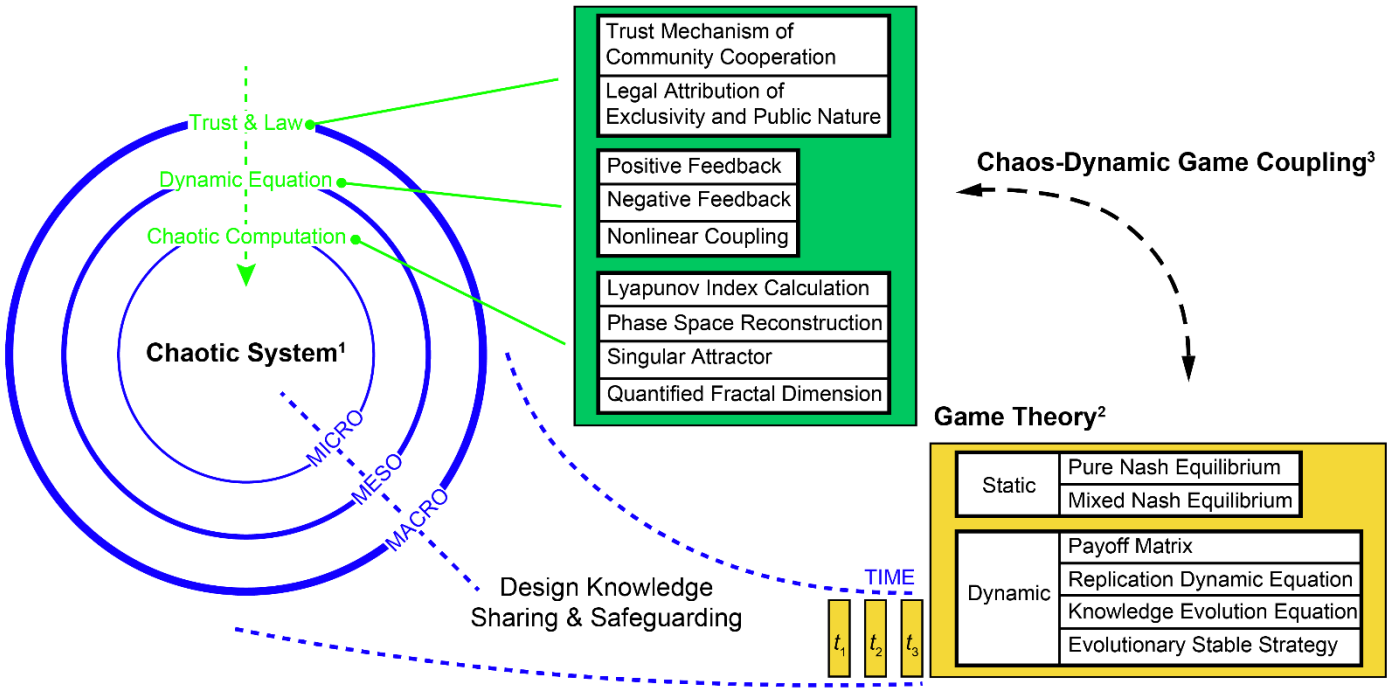

Figure 6. Ethical Design Knowledge Management.

4. Ethical Design Knowledge Flow from Digital Community

Existing design community platforms are exploring knowledge-sharing and safeguarding measures, such as Creative Commons licenses, digital watermarking technology, metadata anchoring, copyright reporting mechanisms, etc. At the same time, safeguarding measures may include digital rights management (DRM), privacy Settings, banning downloads, etc. But be aware of the ethical implications that these measures may

bring, such as over-safeguarding that may limit knowledge sharing, or lax policies that lead to infringement problems.

Therefore, the objects of this study are set as Pinterest, Behance, Dribbble, DeviantArt and Zcool. All of these are knowledge-sharing design platforms with interactive communities as the core. This type of community platform allows creative professionals (artists, designers, photographers, and others in the creative field) to showcase and discover creative work, and to enable the flow of knowledge through open social interaction (following, liking, commenting, etc.). The platform covers the full spectrum of visual design. From graphic design (e.g., Behance and Adobe Creative Cloud), user interface prototyping (e.g., Dribbble), and digital art (e.g., DeviantArt) to localized commercial design (e.g., Zcool), there are vertical subdivisions of specialization. Pinterest uniquely connects the front end (concept generation) and the end (finished product display) of the design process through the "Mood Board" mechanism. Zcool deeply integrates the demand of e-commerce and design competition to realize the direct transformation of knowledge sharing into commercial value but generates the risk of creative homogenization while creation.

The five platforms selected above all build a closed-loop ecosystem of creation, dissemination and feedback. There are three layers of creative Commons: (1) The base layer is standardization of work metadata (e.g., Behance's Project Details template mandates labelling of authoring tools, collaborators, and copyright notices); (2) Interaction layer is knowledge diffusion driven by the social graph (e.g., Dribbble's Shot push algorithm prioritizes the work of followers); (3) Derivative layer is secondary creation incentives (e.g., DeviantArt's Literature community allows poetry to be adapted from visual works)

In terms of ethical risk prevention and control, it is found that platforms generally face the governance paradox of "Limited sharing and Bottom-line safeguarding". It can be divided into the triple promotion path of knowledge sharing and the dual characteristics of enabling and restricting knowledge safeguarding.

The promotion of knowledge sharing by the platform is embodied as a triple path. The first is to break down industry barriers through the weak connectivity of social networks, such as Dribbble's "Rebound" feature that allows designers to adapt others' work and tag the original author. The second is to build informal learning Spaces, such as Behance's "Creative Challenges" to provide structured skill transfer. The third is the use of algorithm recommendation to realize the explicit implicit knowledge, such as Pinterest's visual search tool can automatically associate the user's collection of images with color theory or composition law labels.

The practice of knowledge safeguarding is characterized by both technical empowerment and institutional constraint. At the technical level, digital fingerprint technologies such as digital watermarking (e.g., Pinterest), metadata anchoring (e.g., Behance's Content Authenticity Initiative), and blockchain storage (e.g., Zcool's "original storage chain") are adopted. At the institutional level, a dynamically balanced knowledge governance framework is formed through Creative Commons customization options (e.g., DeviantArt, which offers 25 copyright combinations) and regional regulatory adaptation (e.g., Zcool's green channel for infringement complaints).

All of these platforms explore knowledge sharing and safeguarding from their domain dimensions. Taking the Behance community platform with more design ecology as an example, through the two-tier architecture of "free work exchange & paid knowledge market", the organic unity of knowledge sharing gradient and commercial value transformation is realized, as shown in the **figure 6**.

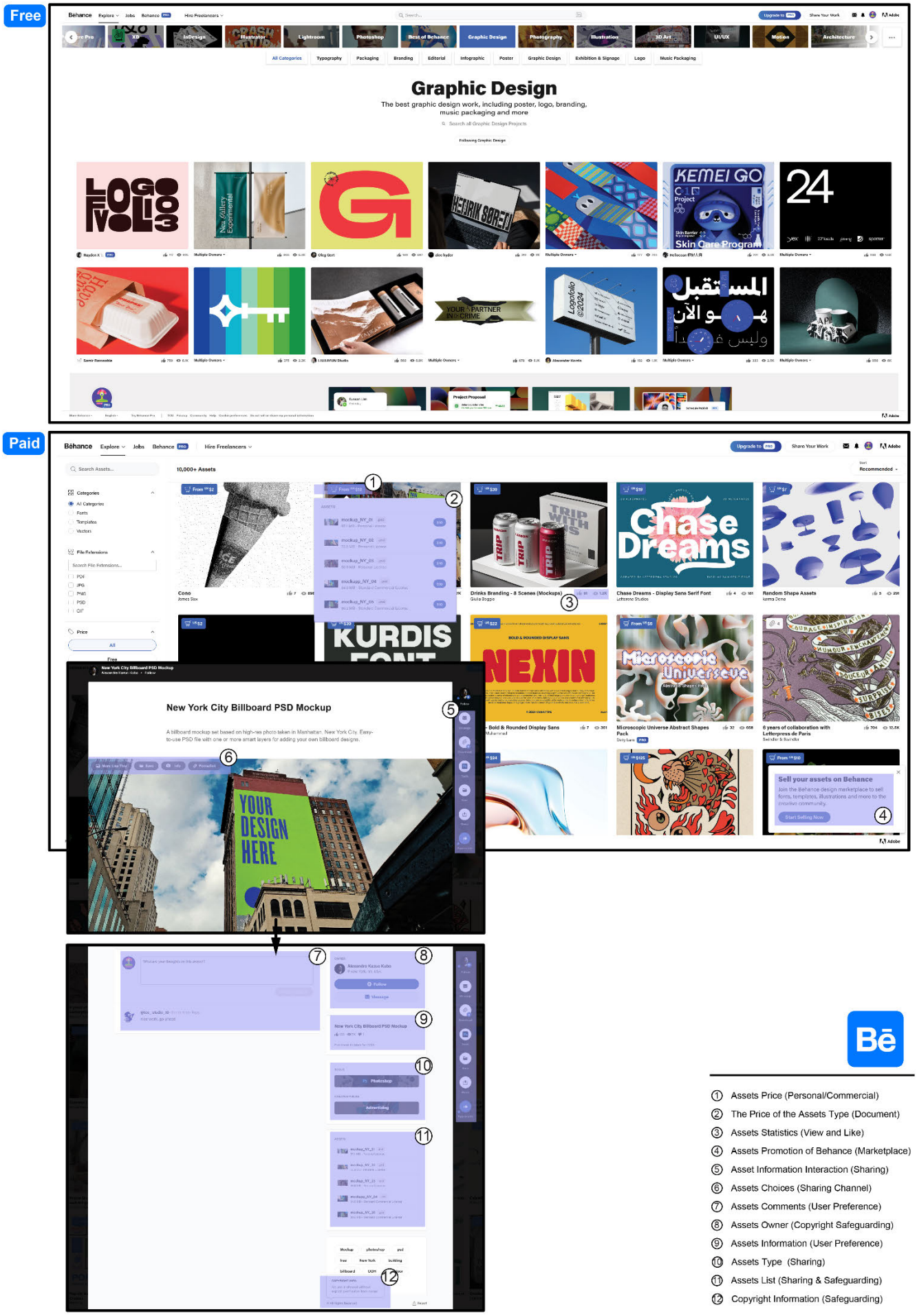

Figure 6. Limited sharing and bottom-line safeguarding of the Behance platform, Source: (Behance 2025).

5. Tragedy of the Commons from Ethical Design Knowledge Flow

The ethical design flow based on chaos and game support proposed in this study is a new thought for design work in the context of digital ethics. In the past, most people highly praised the improvement of design efficiency of digital design platforms. But often ignored the copyright supervision of design platforms, the safeguarding of intellectual property rights of designers and the cultivation of design ethics of users.

Therefore, from the macro, meso and micro aspects of chaos theory, the potential dynamic analysis of design cooperation in digital communities is supported by nonlinear dynamic equations. The equation presents the effects of positive feedback, negative feedback and nonlinear coupling on the relevant dimensions of the three subjects. At the same time, the behavior elements with time series are revealed, and the phase space reconstruction and singular attractor determination are used to capture more detailed propagation and diffusion paths. However, it is a pity that the quantitative calculation of the platform case data cannot verify it. To a great extent, the chaos threshold design of the platform system will directly affect the chaos toughness, that is, the platform sharing and safeguarding strategy. The selection of chaos threshold caused by the differential positioning of the platform itself cannot be ignored.

For the dynamic game, although the dynamic game and knowledge evolution dynamics reveal the dynamic nature of design knowledge flow, the heterogeneity of agents is still clearly bounded, resulting in a single payment matrix. The introduction of the accumulation concept of reputation discount may lead to the existence of multi-lateral reputation cross-discounts and reputation bubbles of endogenous risk in social networks. In general, there is still a lot of room for future research on designing knowledge management from the perspective of chaos and game, especially more multi-phase space dimensions and internal and external variable factors.

6. Conclusion

This study employs chaos theory and dynamic game methodology to systematically analyze the ethical design knowledge flow, and delineate the current landscape of mainstream design knowledge communities. Through comparative analysis of platform case studies, this research identifies appropriate measures for knowledge sharing and protection. It is evident that further investigation into the chaotic and gaming dynamics of heterogeneous agents within knowledge community behavior systems is warranted. Notably, this study has limitations, including the failure to implement dynamic calculations and behavioral simulations based on chaos and dynamic game theories in the design of knowledge community cases. Future research will undertake more comprehensive simulation calculations after capturing behavioral data from platform datasets. Additionally, as research progresses, comparing the proposed knowledge flow of ethical design with existing design platform strategies will facilitate future studies on digital ethics. Moreover, while this paper focuses on theoretical and methodological aspects, it will continue to conduct in-depth empirical analyses on multiple cases to gain a more holistic understanding of the management framework for knowledge flow in ethical design.

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Navigating privacy concerns in smart home: Exploring challenges and design strategies from a family perspective

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ABSTRACT | Existing literature mainly focuses on smart home privacy concerns from an individual perspective, underappreciating family member interactions in smart homes and related privacy concerns, especially within Chinese culture-based contexts. This study, grounded in the context of typical Chinese household environments, explores the challenges of privacy perception in smart home design from a family perspective and seeks potential design opportunities to address them. Using a multi-case study research design, we investigated 11 households utilizing smart home devices, conducting 20 in-depth interviews with family members. From the perspective of multi-member interaction behaviors, our thematic analysis identified four key aspects around users' privacy perceptions in interactions with smart home devices: (1) Privacy concerns regarding data sovereignty; (2) Privacy concerns in user psychology; (3) Privacy concerns arising from system configurations; (4) Privacy concerns regarding family member collaboration. The findings underscore the need for improvements in smart home system design, including the development of enhanced smart home maintenance services, the provision of customizable user data storage options, and the implementation of more trustworthy interaction mechanisms to enhance user experience. This study offers deeper insights into smart home research by elucidating the evolving dynamics of user privacy perception within family interactions. It further provides theoretical and practical contributions to optimizing and developing smart home technologies.

KEYWORDS | SMART HOME, DATA SOVEREIGNTY, PRIVACY CONCERN, INTERACTION DESIGN, CASE STUDY

1. Introduction

With the extensive adoption of smart homes, research on smart home technologies and devices has drawn significant attention. Since the term "smart home" was initially coined by Richard Harper in 1984 at the American Association of House Builders (Dingli & Seychell, 2015), subsequent scholars have conducted in-depth research on various aspects of smart home systems.

In the early days, investigations primarily revolved around the interaction between individual users and smart home setups. A case in point is the study by Cabitza, Fogli, Lanzilotti, and Piccinno (2017), which highlighted how goal-oriented interfaces play a crucial role in augmenting user capabilities. Similarly, Gupta and coauthors developed a multi-objective reinforcement learning framework that aims to minimize energy consumption while maximizing user satisfaction(Gupta, Bhambri, Dhingra, Buduru, & Kumaraguru, 2020). More recently, research efforts, such as those by Netinant, Utsanok, Rukhiran, and Klongdee (2024), have explored IoT-enabled smart home security and automation. Their research endeavors seek to enhance user-friendliness by incorporating voice commands and sensor integration. Overall, these research trajectories across different timeframes illustrate the dynamic evolution of smart home research.

Most studies primarily examine privacy concerns in smart home environments from an individual perspective. This body of literature examined users' privacy perception from multiple perspectives, including the influence of user emotions (Park, Choi, & Jung, 2021), users' convenience needs (Zheng, Apthorpe, Chetty, & Feamster, 2018), privacy framework for smart homes (Bugeja, Jacobsson, & Davidsson, 2021) and privacy transparency (Janssen, Matheus, Longo, & Weerakkody, 2017).

The home serves as a crucial application scenario for smart home technologies, where multiple smart home devices can be shared and synchronized through collaboration and interaction among family members. However, there is a lack of research on how such interactions and collaborations influence users' privacy perceptions. Family members encounter significant privacy challenges when jointly using smart home devices. For instance, due to the exchange of information among multiple members, individual family members may develop distinct privacy perceptions based on their experiences with smart home device usage.

To fill this research gap, this research aims to aims to explore the following research questions:

(1) How do family members perceive privacy concerns within smart home systems?
(2) What UX design strategies can mitigate these privacy concerns?

Our research is based on a set of typical smart home scenarios in China. It is important to acknowledge that the study has limitations in terms of cultural diversity. The findings primarily reflect an in-depth exploration of privacy and security concerns within Chinese smart home households, and may not fully represent or address similar issues in other cultural contexts.

Our research enhances smart home scholarship by providing deeper insights into the sociocultural privacy dynamics within smart home systems. More broadly, it offers novel perspectives and strategies for UX design in smart system environments, contributing to the advancement of user experience design in interconnected digital ecosystems.

2. Literature Review

2.1. Smart home

The term “Smart Home” was originally coined by Richard Harper in 1984 at the American Association of House Builders, marking the beginning of its conceptual evolution (Dingli & Seychell, 2015). Initial interpretations, such as those articulated by Lutolf in 1992, framed smart homes as systems integrating diverse services via a unified communication network (Lutolf, 1992). In a contemporary context, Satpathy has expanded this definition, positing smart homes as environments that enhance the independence and comfort of residents through an interconnected framework of mechanical and digital devices, thereby fostering an interactive living space (Satpathy, 2006).

In the field of smart home research, researchers have identified a variety of factors that influence user engagement with smart home systems (Li et al., 2023; Shuhaiber & Mashal, 2019; Singh, Psychoula, Kropf, Hanke, & Holzinger, 2018) while also focusing on control methods within these systems (Neßelrath, Lu, Schulz, Frey, & Alexandersson, 2011; Vogiatzidakis & Koutsabasis, 2019). Regarding smart home frameworks, Muddasser Alam and coauthors have proposed a new framework that simplifies the modeling, prototyping, and simulation of smart infrastructures, facilitating the construction of smart home models and the application of AI technologies (Alam, Alan, Rogers, & Ramchurn, n.d.). Additionally, Hu and her team introduced an innovative system framework that reduces system load and optimizes response times (Hu, Tang, Liu, & Wang, 2016). Further studies have focused on applying smart home systems in energy optimization (Machorro-Cano et al., 2020; Reinisch, Kofler, Iglesias, & Kastner, 2011). Overall, the essence of smart homes lies not just in individual devices but in the interconnectedness and communication within the entire system.

2.2. Privacy concerns in smart home

In recent years, smart home (SH) devices have become widely used in domestic spaces (Kim, Park, & Choi, 2017). With the advancement of technology, the Internet of Things (IoT) has taken a prominent role in smart homes. These devices enable remote and multi-modal control through various communication protocols and routing protocols, such as Wi-Fi, Bluetooth, Radio Frequency Identification, and Local Area Networks, thus enhancing the convenience and functionality of smart homes (Zielonka et al., 2021).

Along with the extensive adoption of IoT in smart homes, privacy concerns have become a significant focus of research in human-computer interaction. In real-time monitoring environments supported by IoT , security and privacy have emerged as key challenges for users (Ismagilova, Hughes, Dwivedi, & Raman, 2019; Tawalbeh, Muheidat, Tawalbeh, & Quwaider, 2020; Zhou, Cao, Dong, & Vasilakos, 2017). For instance, when using IoT devices, users need to transmit a large amount of personal information to the cloud to enable the ubiquitous nature and extensive internet connectivity of the devices. This reliance on cloud storage makes privacy more vulnerable to unauthorized access or leakage, and the cloud-based storage system itself is susceptible to attacks and data breaches (Zhou et

al., 2017). Moreover, as smart home devices become increasingly interconnected, involving more extensive computation and information exchange, the importance of addressing privacy concerns in smart home contexts has only intensified.

Within the realm of smart homes, existing studies have explored both the “formation mechanisms” and the “resolution strategies” of privacy concerns. In terms of formation mechanisms, researchers have examined the psychological experiences, emotions, attitudes, and identities associated with privacy concerns across individual, social, and policy levels.

At the individual level, studies have investigated users’ privacy behaviors and attitudes toward privacy in smart home environments. For example, regarding the impact of privacy concerns in smart homes on user behavior and attitudes, Park and coauthors explored the influence of privacy issues related to smart speakers, finding that negative emotions mediate the relationship between privacy concerns and users’ coping behaviors (Park et al., 2021). Zheng and coauthors conducted interviews to study users’ privacy attitudes in smart homes, discovering that users’ privacy behaviors were significantly influenced by their need for convenience (Zheng et al., 2018). Notably, Chalhoub and coauthor, through a six-month ethnographic study of six UK households, examined the inconsistency in users’ management of security and privacy from a longitudinal perspective. They found that while granting permissions was relatively easy, revoking permissions was often difficult, revealing a significant imbalance between granting and refusing consent. Their study also identified security and privacy issues arising from the repurposing of smart home devices for unintended uses, highlighting the risks associated with devices being used beyond their original design (Chalhoub, Kraemer, & Flechais, 2024).

At the social level, existing research has explored the dynamics of privacy concerns in interactions between household members or between household members and external users. For example, Windl and Mayer introduced the concept of the “bystander” as a social actor, who is concerned with privacy issues in the smart home environment. Their study found that bystanders’ privacy concerns were significantly higher than those related to personal computing devices and were closely linked to the strength of social relationships (Windl & Mayer, 2022). Other studies have focused on interactions between social actors such as nannies and parents. Abu-Salma and coauthors compared the privacy threat models of nannies and parents, revealing that the role and identity of the device user significantly affect privacy perceptions (Abu-Salma, Choy, Frik, & Bernd, 2024). In the same year, Zhang and coauthors focused on the privacy attitudes of elderly individuals toward surveillance cameras, emphasizing the profound impact of privacy breaches on dignity and control. These studies collectively reveal how privacy concerns are influenced by emotions, social relationships, and user roles (Zhang et al., 2024). Furthermore, as technology becomes more widespread, Kraemer and coauthors proposed a descriptive framework illustrating how family members collaborate to achieve shared privacy goals, emphasizing the central role of roles and rules in managing privacy within households (Kraemer, Chalhoub, Webb, & Flechais, 2023).
Researchers have further recognized the significant impact of context on user privacy. Abdi and coauthors studied privacy norms in smart home personal assistants, focusing on the influence of contextual integrity on the acceptability of information flows, laying the foundation for understanding privacy rules in complex ecosystems (Abdi, Zhan, Ramokapane, & Such, 2021). Lehikoinen and coauthors applied privacy theories from social sciences to examine how interactions between people, devices, and environments influence users’ privacy (Lehikoinen, Lehikoinen, & Huuskonen, 2008).

Despite the burgeoning research on smart home privacy, a notable gap exists. Current privacy studies mainly adopt a single - user perspective, overlooking the fact that smart

homes are used by multiple individuals, especially within family settings. In real families, members have diverse privacy attitudes, tech proficiencies, and usage habits. For example, parents might worry about children's data privacy, and data sharing among family members in smart homes raises complex privacy issues. However, there is limited research on these multi-members family - specific privacy concerns. This study aims to bridge this gap by introducing a multi-member perspective to smart home privacy research.

3. Methods

We conducted an inductive, exploratory case study to investigate the nuanced privacy perceptions of smart home users, focusing on the experiences of multiple family members within real-life contexts. This qualitative approach, effective for examining contemporary phenomena where boundaries are blurred (Yin, 2003), aimed to provide a deep understanding of the factors influencing privacy in the usage of various smart home products. By integrating rich descriptions and insights, our study sought to illuminate broader social phenomena, personal experiences, and cultural differences, thus offering a nuanced interpretation of privacy dynamics in smart homes.

3.1. Research setting

We recruited 12 families in China based on their extensive use of smart home devices and the presence of multiple family members (see Table 2). Additionally, these families owned diverse smart home devices and experienced varied usage contexts (see Table 1). This setting provided an ideal background for exploring our research questions, as it allowed for an in-depth investigation of smart home users' privacy perceptions in an environment where smart home technology is seamlessly integrated into daily life.

It is important to note that the contextual setting of our study is limited to Chinese households. This focus was shaped by two primary considerations. First, in terms of data accessibility, we had greater proximity and access to Chinese families, which facilitated deeper ethnographic engagement. Second, our aim was to enrich the current body of literature on privacy concerns, which predominantly centers on Western contexts, such as those in Northern Europe or the United States. In contrast, there remains a notable lack of research on privacy perceptions and practices in China. Our study thus contributes to filling this gap by offering culturally grounded insights.

Specifically, the Chinese smart home context presents several distinctive characteristics. These include: (1) a more collectivist cultural orientation with stronger alignment with governmental structures; (2) a higher tolerance toward privacy compromises among users; and (3) potentially more severe conditions of privacy leakage and misuse compared to mainstream Western countries. These contextual factors make the Chinese case particularly valuable for expanding the global understanding of privacy dynamics in smart homes.

Table 1. Sampled Cases

	Event	Family members in event	Smart Home Devices
C1	User remotely uses a smart camera installed in the yard to keep the elderly safe and watch their movements around the house.	User, User's father, User's mother	Smart camera
C2	Using a Smart Robotic Vacuum Cleaner for the daily cleaning of home environment.	User, User's father, User's mother	Smart robotic vacuum cleaner, Smart speaker
C3	Using smart speakers to go to the convenience of looking up information and making itineraries.	User, User's elder brother	Smart speaker
C4	Daily emotional companionship for the elderly at home with smart speakers.	User, User's husband, User's father, User's mother	Smart speaker
C5	Users use a smart robotic vacuum cleaner to check whether their sister is at home.	User, User's younger sister	Smart robotic vacuum cleaner
C6	Multiple family members at home collaborate to use smart cameras to check on the status of the elderly at home.	User, User's younger sister User's husband, User's father, User's mother	Smart camera
C7	The user uses a smart camera to monitor their home while on a business trip.	User, User's mother	Smart camera
C8	Elderly family members use a smart speaker for daily emotional companionship.	User, User's husband, User's father, User's mother	Smart robotic vacuum cleaner
C9	The morning light setup activates before the elderly typically wake up, ensuring their safety	User, An elderly, User's mother, User's child	Smart Lights
C10	The smart speaker was accidentally activated during a family gathering conversation.	User, User's father, User's mother, User's grandfather, User's grandmother	Smart robotic vacuum cleaner
C11	Smart robotic vacuum cleaner suddenly malfunctioned at home and emitted a human-like voice.	User, User's father, User's mother、User's grandfather, User's grandmother	Smart robotic vacuum cleaner
C12	The smart speaker keeps uncontrollably connecting to user's smartphone.	User	Smart speaker
C13	Smart robotic vacuum cleaner, which had been used for a long time, suddenly broke down and needs to be sent out for repairs.	User, User's husband, User's father, User's mother	Smart robotic vacuum cleaner
C14	The smart speaker inserts product advertisements during use, overlapping	User, User's father, User's mother, User's maternal aunt	Smart speaker

	with the user's recent conversations.		
C15	User discovers fingerprint traces left on their long-term used smart door lock.	User	Smart door lock
C16	The user's father sent them a video about someone else's smart door lock privacy issue.	User, User's father	Smart door lock
C17	The user's father sent them a video about a case where someone's smart door lock was unlocked and their home was burglarized.	User, User's father	Smart door lock
C18	The user discovered that they could see their grandparents' phone screen content through the smart camera.	User, User's grandfather, User's grandmother	Smart camera

*C=Case

Table 2: Demographics of the participants

	Age	Gender	Technology acceptance level	Composition of family smart home devices
P1	35	Female	High	Smart robotic vacuum cleaner
P2	22	Female	High	Smart camera, Smart speaker, Smart doorbell
P3	30	Female	High	Smart camera, Smart speaker, Smart Door lock, Smart robotic vacuum cleaner, Smart curtains
P4	27	Female	Middle	Smart robotic vacuum cleaner, Smart TV
P5	34	Male	Low	Smart speaker
P6	38	Female	Middle	Smart robotic vacuum cleaner, Smart TV, Smart door lock
P7	41	Male	Middle	Smart speaker, Smart TV
P8	40	Male	High	Smart robotic vacuum cleaner, Smart speaker, Smart door lock，Intelligent washing machine
P9	37	Female	Middle	Smart robotic vacuum cleaner, Smart speaker
P10	26	Male	Middle	Smart robotic vacuum cleaner, Smart door Lock
P11	30	Female	High	Smart speaker, Smart camera, Smart door lock
P12	43	Female	Low	Smart speaker, Smart TV

*P=Participant

3.2. Sampling strategy

This study employed purposive sampling, with 12 smart home users were recruited online, representing diverse demographic characteristics in terms of gender, age, household composition, types of smart home devices used, and usage contexts (see Table 2). Each participant participated in a semi-structured interview lasting approximately 30 to 50 minutes, conducted in Mandarin. This approach was designed to capture a broad spectrum of experiences and perspectives on smart home usage and privacy perceptions.

3.3. Data collection

Our primary data source consists of semi-structured interviews, with each interview lasting approximately 30 to 35 minutes per participant. Each participant was interviewed once every two days, for a total of seven interviews over a 14-day period. All interviews were conducted online via Zoom. Prior to participation, we obtained informed consent from all participants.

The interview questions were divided into five main sections. The first section collected basic demographic information, including the number of family members, the types and number of smart home devices used, the duration of device usage, and participants' attitudes toward smart home technology. The second section focused on privacy concerns arising from the everyday use of smart home devices within the household. Participants described incidents that triggered privacy concerns and explained the reasons behind their concerns. The third section asked participants to describe typical scenarios in which family members jointly used smart home devices and to assess whether these interactions could lead to privacy concerns, encouraging them to provide as many details as possible. The fourth section explored specific cases where smart home technology raised privacy concerns, using prompt questions to investigate the challenges and opportunities within these interactions.

Our online participants were recruited through digital channels. Before participating in the study, each participant underwent an initial semi-structured interview lasting approximately 30 minutes.

3.4. Data analysis

This study utilizes thematic analysis to identify, examine, and interpret recurring patterns (themes) within the data. Rather than simply summarizing the information, this method enables a comprehensive and in-depth understanding of the findings (Braun & Clarke, 2006). Our approach is inductive, exploratory, and data-driven, progressively incorporating theoretical frameworks throughout the empirical analysis.

The initial analysis involved coding 18 distinct family interaction events where smart home usage led to privacy concerns. These events, defined as various scenarios in which family members engage with one or multiple smart home devices, were analyzed to capture participants' concerns, emotions, interpretations, and expectations.

Following a family perspective, we coded dynamic interactions, particularly those involving privacy concerns in collaborative device use. Further analysis explored the underlying causes of these concerns and potential design improvements to enhance users' psychological comfort. Employing an iterative, inductive approach, the study continuously refined insights, leading to well-founded research conclusions.

4. Findings

Our analysis reveals four prevailing themes influencing family members' privacy concerns regarding smart home usage: (1) privacy concerns regarding data sovereignty; (2) psychological privacy concerns of the users; (3) system configuration-related privacy concerns; (4) privacy concerns related to family member collaboration. Below, we will elaborate on each of these themes in detail.

4.1. Privacy concerns regarding data sovereignty

We have found that users' concerns about data sovereignty influence their perceptions of privacy. Data sovereignty refers to the control over data being attributed to the data provider or the country in which the data is located, subject to relevant laws and regulations (Hummel, Braun, Tretter, & Dabrock, 2021) . However, the presence and stringency of data sovereignty significantly impact the privacy perceptions of smart home users.

First, we observed that some users' privacy concerns regarding government access to their data are particularly pronounced in the context of corporate data breaches. For instance, if a company provides users' private data to foreign governments or corporations, it may heighten users' privacy concerns. As one participant, P8, stated: "There was news about a Chinese company, Didi, allegedly attempting to sell data to the United States. I am also worried that smart home software might sell my data to other countries." Therefore, corporate data breaches under the framework of data sovereignty can lead to heightened privacy concerns among users.

Furthermore, we found that users with high privacy concerns identified smart home devices as a potential source of persistent privacy risks, a concept they referred to as "privacy inheritance." This concern arises from the fear of excessive personal data collection during seamless device usage and the potential risk of data being accessed after the user has passed away or abandoned the device. The fact that users do not retain sovereignty over this data exacerbates their privacy concerns, particularly if such data is accessed by governments or corporations. One participant elaborated: "Before owning smart home devices, I was not as lazy, nor did I have so many concerns. However, once I started using them, I became dependent on their convenience. If one day these devices severely infringe on my privacy, I might dispose of them all. I am worried that society, and even the government, knows everything about me. Losing money is a significant loss, but what is worse is the thought that after my death, my private data might still be accessed I would not be able to rest in peace."

4.2. Privacy concerns in user psychology

We found that smart home users' perceptions of privacy are significantly influenced by their subjective assessment of the potential targets of data breaches. Current smart home users tend to identify subjective data breach targets and evaluate the consequences and impacts of potential privacy leaks. Our interviews revealed that the majority of smart home users exhibit weaker privacy concerns when the target of the data breach is the smart home company or service provider, compared to when the target is hackers or malicious individuals. For instance, one participant P1, stated: "If sharing data with them can lead to better services, then let them take it."

Additionally, another participant, P2 in C2, remarked: "I'm willing to take on these privacy risks for the sake of convenience. If the floor plan of my home doesn't fall into the hands of thieves, it's not a big deal." This highlights how users' conceptualization of the target of privacy breaches significantly impacts their privacy perception.

Beyond the target of data breaches, we also identified that users' evaluation of the consequences of privacy leaks influences their privacy perception. During the interviews, participants reflected on potential privacy risks associated with their regular use of smart home devices. For example, when discussing privacy concerns, participant P3 said: "I don't

see privacy as an issue when it's about exposing non-critical personal data through smart home devices. But when it involves money, that's something I can't accept or afford."

We also observed that users with lower privacy concerns regarding their smart home devices often had higher trust in the brand they chose before purchasing. These users tend to perceive lower privacy risks compared to others. For example, participant P4 shared: "I feel more confident in the handling of user privacy by Xiaomi, a prominent Chinese technology company known for its smart products. However, for other companies that mainly produce devices like robot vacuums and TVs and do not primarily focus on backend technology, I perceive their privacy protections to be less robust."

Moreover, users often balance privacy and convenience in their subjective decision-making processes, especially in context-specific scenarios. For instance, participant P2 shared: "I sometimes realize that smart home devices might leak my privacy, but I feel their protective functions outweigh those risks. For example, I use cameras to monitor family members when I'm not at home, and at that moment, privacy concerns become irrelevant." This indicates that users are willing to compromise privacy for the convenience these devices offer.

4.3. Privacy concerns arising from system configurations

Our analysis reveals that certain system features in smart home devices significantly affect users' privacy perceptions. Specifically, we identified six aspects of smart home systems that are closely linked to users' privacy concerns: the excessive integration of smart home devices with other user devices, the system architecture of smart home components, the service and repair methods provided by smart home manufacturers, residual user privacy information left on smart devices, the highly personalized recommendation systems developed during smart home usage, and the interaction wake-up mechanisms embedded in smart home systems.

We found that when smart home devices are overly integrated with other user devices, this seamless connectivity increases users' privacy concerns. This phenomenon is closely related to users' inability to control or monitor such interactions. For instance, participant P5 in C12 mentioned: "I had an experience today where I felt my privacy was at risk while using a smart speaker. The speaker in my home frequently connects to my phone without any prompt. This situation made me feel very confused and worried. I immediately checked the connection status, fearing that the speaker might access my call logs, messages, private photos, or other family members' information." Such automated connectivity leads to heightened privacy concerns as users fear the possibility of data leaks or unauthorized associations beyond their control.

We also discovered that the repair methods of smart home devices impact users' privacy perception. Some repair processes, such as requiring users to send devices to a service center, increase privacy concerns. For example, participant P6 in C13 shared: "My robot vacuums cleaner broke down recently, and I sent it back to the manufacturer for repair. It's been a while, and it hasn't returned. Since the robot has been used for a long time, it knows the layout of my house and has recorded family voice commands. I'm worried that the manufacturer might extract this data and leak our personal information."

The highly personalized recommendation functions of smart home devices strongly correlate with user privacy concerns, significantly intensifying users' apprehension. When the recommended content aligns too closely with users' intentions or behaviors, users often perceive that their daily lives and private conversations are being "monitored" by the devices, resulting in heightened discomfort and mistrust. Firstly, when personalized

recommendations closely match users' expressions or intentions, users may suspect that the devices are monitoring their conversations or behaviors. As Participant P12 noted, "Sometimes when I'm chatting with friends about something like a TV show, my smart TV will suddenly display advertisements or recommendations related to it. It feels like the device is listening to our conversations, as though I'm being watched." Such highly precise recommendations lead users to believe that their private exchanges are being recorded covertly by the devices. Secondly, when smart home devices push commercial advertisements that strongly overlap with users' everyday data, concerns about excessive data collection or potential leaks become more pronounced. For instance, participant P5 in C14 shared, "One day, while using my smart speaker to play music, it suddenly started broadcasting product recommendations for items I had never searched for before. These products, however, seemed to be related to recent conversations I had." This phenomenon not only deepens users' suspicions about privacy breaches but also reinforces their perception that their usage behavior is under constant surveillance.

We found that residual privacy information left on smart devices due to certain materials or designs exacerbates users' privacy concerns. For instance, smart locks that use fingerprint or password mechanisms often leave visible traces of fingerprints or pressed keys, making users anxious about potential misuse. Participant P8 in C15 remarked: "Today, I noticed that our smart lock had obvious fingerprints on it after use. I'm worried someone could exploit this information to break in."

Erroneous activation of interaction mechanisms in smart home devices significantly heightens users' privacy concerns. Many smart home systems rely on voice-activated wake-up words, such as "Xiao Ai" for Xiaomi devices, "Tmall Genie" for Tmall devices, or "Xiao E" for Huawei devices. These mechanisms can be triggered by similar-sounding phrases or system malfunctions, giving users a sense of being "monitored." Participant P9 in C10 shared: "Today while talking to my family about private matters like income and insurance, the smart speaker suddenly responded with 'I'm here.' It made me feel like the speaker was listening to the whole time, which is extremely concerning. If such private conversations were accessed by malicious actors, it would be very dangerous, as if my family's secrets were exposed." System malfunctions also contribute to these concerns. For example, participant P9 in C11 recalled: "While at home, the charging light of my robot vacuum suddenly turned on, and a man's voice came from it. It was terrifying. I asked my dad if he had logged in, and he said no. This made me feel like the device is spying on us." Moreover, the human-like responses of smart devices often amplify users' privacy worries, as they make the devices feel more intrusive.

The foundational system architecture of smart home devices influences privacy perceptions. Different implementation methods for similar functionalities can lead to varying levels of privacy concerns. For instance, we found that users choosing robot vacuums often compare models based on whether they use radar or vision-based obstacle avoidance systems. Users perceive radar-based systems as likely to cause fewer privacy concerns. Participant P8 noted: "When purchasing products, I consider their system architecture. I think choosing products with mechanisms that better protect privacy can help mitigate privacy risks."

4.4.Privacy concerns regarding family member collaboration

Our study reveals that the collaborative use of smart home devices and interactions among multiple family members can significantly influence privacy concerns among certain household members. Specifically, we identified three aspects: emotional attachment to smart home devices leading to user dependency and affecting other

family members' privacy perceptions; the impact of collaborative information-sharing functions on privacy concerns; and the transmission of privacy-related incidents among family members, which influences their perception of privacy risks.

First, emotional attachment to smart home devices can foster user dependency, thereby influencing the privacy perceptions of other family members. For example, in households with elderly members or children, these individuals may develop a sense of companionship with smart home devices, such as smart speakers, which creates a form of emotional reliance. This sense of companionship can, in turn, affect other family members' concerns about privacy. Participant P9 in C8 noted: "The elderly in my family have grown accustomed to the companionship of the smart speaker and treat it as if it were their grandchild. Whenever I see this, it alleviates some of my concerns about the device's privacy risks." This finding highlights how the differential use and perception of smart home devices among family members can influence privacy concerns across the household.

Second, we found that the transmission of privacy-related incidents among family members can shape privacy perceptions and even prompt protective measures. In many cases, family members who share privacy breach incidents or potential risks on social media can significantly affect others' awareness of privacy concerns. For instance, participant P2 in C16 shared: "My father sent me a video about smart locks, showing how a small magnet could make it seem like the door was locked when it wasn't. After watching the video, I conducted a two-day inspection of the locks at home." Similarly, participant P11 in C17 noted: "My father sent me another anti-theft video, asking me to wipe down the smart lock. The video showed how burglars scouted homes, which made me anxious." This type of information-sharing not only impacts family members within the same household but can also extend to users of similar smart home devices, amplifying privacy concerns through social media channels.

Finally, we observed that the different contexts in which collaborative viewing functions of smart home devices are used can also influence users' privacy perceptions. For example, when family members use smart cameras to monitor others in the household, they may inadvertently expose sensitive information, such as the content of private conversations or mobile phone screens, which can heighten privacy concerns. Participant P2 in C18 stated: "When the elderly sit under the camera playing with their phone, it's easy to see the information on their screen clearly." Additionally, concerns about privacy arise when family members use smart cameras to monitor each other. Participant P4 in C6 explained: "As younger family members, we communicate with each other to avoid checking in on the elderly without proper communication. We also monitor for any unknown accounts accessing the system to prevent potential privacy risks."

5. Discussion

In our exploration of interactions among smart home members, we unearthed various privacy concerns. Consequently, we have proposed a comprehensive set of design strategies. By incorporating these privacy - aware elements, the next - generation smart homes can not only deliver seamless functionality but also uphold the privacy rights of every user.

5.1. Provision of differentiated smart home maintenance services

Our first strategy is to offer differentiated smart home maintenance services. Our Analysis

indicates that the current repair methods for certain smart home devices remain relatively uniform. The predominant approaches—on-site repair and mail-in services—pose several concerns. Notably, these methods can exacerbate users' privacy anxieties due to the strong personal association between users and their smart home devices. Losing control over these devices during the repair process may foster distrust among users. Additionally, these repair approaches often entail extended service periods, further heightening users' concerns regarding potential privacy breaches. For instance, as highlighted in C13 from our interview with P6, such concerns were explicitly emphasized. To enhance privacy security in smart home maintenance, this paper proposes a more flexible repair framework. By tailoring repair services to accommodate varying levels of user-device intimacy, it is possible to significantly mitigate users' privacy concerns and improve their overall trust in the repair process.

5.2. Increased control of intelligent interaction privileges

Currently, most smart home devices support voice control through wake words but lack a clearly defined sleep word mechanism. This absence of an explicit deactivation command may lead to concerns regarding user privacy, as it does not provide a convenient way to actively disable voice recognition when not needed. For instance, one of our interviewees, P9, stated, "I prefer to manually toggle the power of XiaoAi so that it only listens when I need it. This makes me feel much safer. "To mitigate such privacy concerns, we propose that smart home systems incorporate an explicit sleep word function, allowing users to easily suspend voice recognition when necessary. Additionally, smart home design should better account for user autonomy by enabling granular control over device access permissions and activation states based on household members' needs. This approach would enhance user trust and improve the overall privacy experience in smart home environments.

5.3. Provide localized storage solutions for privacy-sensitive smart home devices

Most devices that handle highly sensitive user data primarily rely on cloud-based storage solutions. However, this lack of user control over cloud storage significantly amplifies privacy concerns, especially for devices that process visual data. Such devices often contain a large volume of private user information, and the reliance on cloud storage increases the risk of data breaches.

Through interviews, we found that not only individual users, but also entire household members are deeply concerned about potential cloud-based privacy leaks. In a home environment, visual data frequently involves multiple household members, meaning that any privacy breach could have far-reaching consequences. For instance, footage recorded by home security cameras may include daily activities, conversations, and other highly sensitive personal information. If such data were compromised due to cloud storage vulnerabilities, it could pose a severe threat to the privacy of the entire household. Research indicates that localized storage solutions can effectively mitigate these concerns. Although local storage requires larger disk capacity, it provides users with an alternative storage option that enhances privacy control. From the perspective of household interactions, localized storage reduces concerns over data sovereignty by granting each household member greater control over their data. For example, parents can decide what data should be stored locally and implement security measures to safeguard household privacy. This approach not only strengthens individual control over personal data but also protects the collective data privacy rights of the household.

6. Concluding remarks

This study employs case analysis to conduct an in-depth examination of the privacy risks encountered by different family members when using smart home technologies and proposes targeted design strategies to mitigate these risks. The study makes two key contributions to design and privacy research.

First, it introduces the perspective of multi-member family interactions, shifting the focus away from the traditional emphasis on individual-technology interactions to a more holistic view of family dynamics. This perspective enables a deeper exploration of the origins, evolution, and impact of privacy concerns within the interactive process. Second, the study provides a series of design strategies aimed at alleviating family members' privacy concerns, offering designers practical solutions to address the prevalent privacy issues in smart environments.

Although our objective is to thoroughly investigate the dynamic nature of privacy concerns, existing research is limited in terms of the number of cases examined and the cultural contexts considered.

Our study remains constrained by a relatively small number of cases, predominantly situated within Eastern cultural contexts. Future research could expand in the following directions:

First, our study has a notable limitation in terms of cultural context. The research is confined to an in-depth exploration of smart home scenarios within a Chinese cultural setting. Consequently, the findings may be limited in their transferability and generalizability to other contexts. Future research is urgently needed to investigate privacy practices and concerns in smart homes situated in different cultural backgrounds, such as those in Europe or the United States. This is particularly important as users' attitudes toward privacy, as well as the prevalence and nature of data breaches and privacy violations in smart home environments, may differ significantly across cultural and regional contexts. Second, further exploration of privacy risks and corresponding design strategies across different family structures (e.g., nuclear families) is needed to refine research findings and enhance the specificity of design interventions. Third, it is important to examine how to continuously safeguard family members' privacy as smart home technologies increasingly integrate with emerging technologies such as the Internet of Things (IoT) and artificial intelligence (AI), ensuring the long-term relevance of design strategies. Lastly, conducting cross-cultural studies to compare how families from different cultural backgrounds perceive and address smart home privacy concerns can enhance the universality of smart home design and better meet the demands of the globalized market.

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ethical leadership
a new frontier for design

Project RSO: Reclaiming Subjective Objectivity of Visual Literacy

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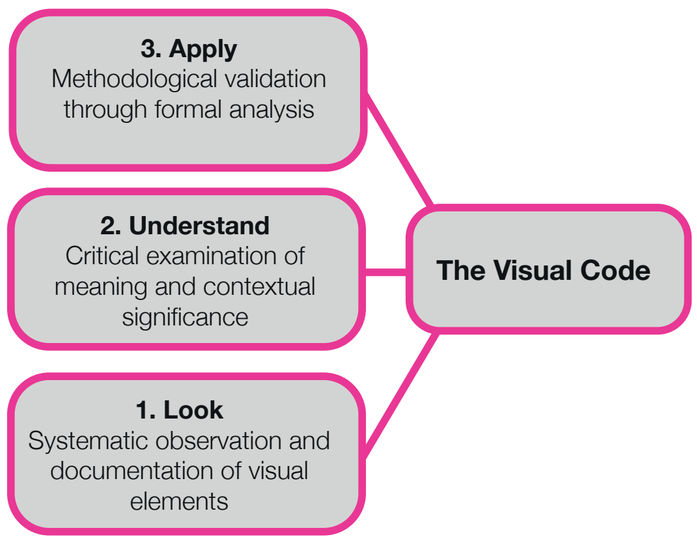
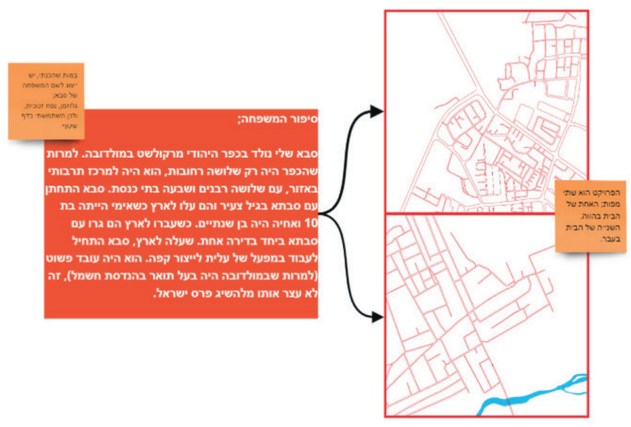
Project RSO: Reclaiming Subjective Objectivity of Visual Literacy In an era characterised by digital revolution and visual culture transformation, established approaches to critical thinking warrant fundamental reconsideration.

Digital platforms and artificial intelligence increasingly challenge conventional cognitive frameworks, particularly within domains marked by inherent ambiguity and requiring enhanced cognitive flexibility.

Building upon established theoretical foundations, **Project RSO** introduces an innovative approach to **visual literacy education** that synthesises critical analysis with evidence-based methodologies. At its core lies the inherent dialectic between subjective interpretation and objective analysis, which the project addresses through systematically structured yet adaptable frameworks.

The Visual Code, our primary pedagogical framework, operates through three interconnected analytical layers:





Whilst maintaining alignment with cognitive flexibility theory, the model has demonstrated considerable efficacy in design education (Topelberg & Ventura, 2024). Our current research examines its implementation within **"Eretz-Ir" (Land-City)**, an interdisciplinary programme integrating secondary school pupils, design students, and educators, thus providing substantive insights into its scalability and cross-contextual applications.

Objectives

- Enhancement of visual literacy through systematically structured yet adaptable analytical frameworks
- Development of rigorous methodologies for critical engagement with digital and AI-generated content
- Establishment of sophisticated cross-educational assessment protocols
- Adaptation of the model to diverse cultural and educational contexts whilst maintaining methodological integrity

Initial Findings

- Enhanced Student Engagement: Participants demonstrated a marked progression from fundamental task completion to sophisticated analytical practices, evidenced through the development of complex digital mind maps synthesising textual elements, critical enquiries, and original visual components.
- Pedagogical Adaptability: Teaching staff exhibited considerable facility in modulating the depth and pace of enquiry to suit varied learning contexts, whilst successfully implementing the methodology across diverse disciplinary domains.

Anticipated Impact

- **Cultivation of sophisticated visual literacy** competencies for navigation of complex media landscapes
- A seamless **integration of traditional and contemporary** pedagogical approaches
- **Enhancement of societal discourse** through elevated media literacy
- Development of **globally applicable frameworks** for visual literacy education

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PAPER SESSIONS WORKING

DIGITAL ETHICS
From UX to Ecosystems, from AI Ubiquity to AI Acceptability

Prototype analysis of an architects' "co-pilot" AI assistant: A smart design system for the architectural design market in mainland china

AUTHORS

Zongyang Cui
Ying Nie
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JUNE 3-7, 2025

1.1. Immediate Factor

- A decrease in both investment and the number of practitioners
- Heavier workload with lower salaries

1.2. Fundamental Factor

- Many architects have lost their hope in the profession
- Our study aims to inspire architects to identify their own strengths while facing AI

2.1. Architectural Planning and Layout Design

AI assist urban planning / Architectural layout planning / Interior floor planning

2.2.Architectural Form and Facade Design

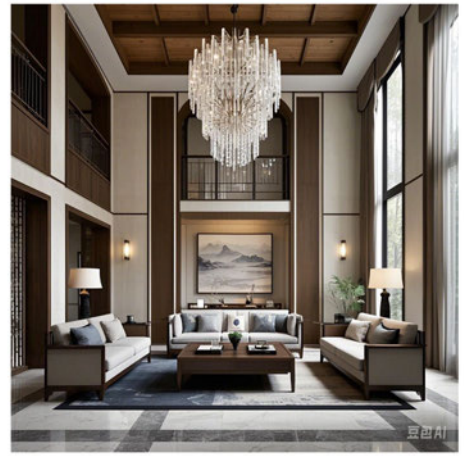
AI assist facade design / visual analysis of urban street-view buildings

2.3.Interior and Landscape Design

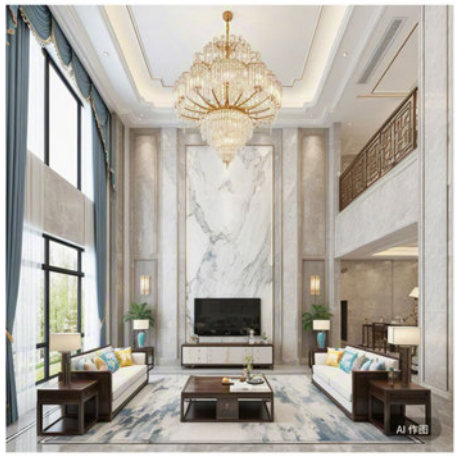
Interior design renderings / plant resource diversity / landscape layouts

2.4.Other Related Technologies

AI search engines / real-time rendering software / "Laser-point-cloud"



Interior rendering generated by Doubao (from ByteDance)



Interior rendering generated by ERNIE Bot (from Baidu)

Design Stages & Interviewees

Schematic Design(SD)
Design Development(DD)
Construction Documents(CD)

UCA

Unite-Create Architects (UCA)

Software

AUTODESK AUTOCAD

SketchUp

Rhinoceros

THAD

Tsinghua University Architectural Design and Research Institute (THAD)

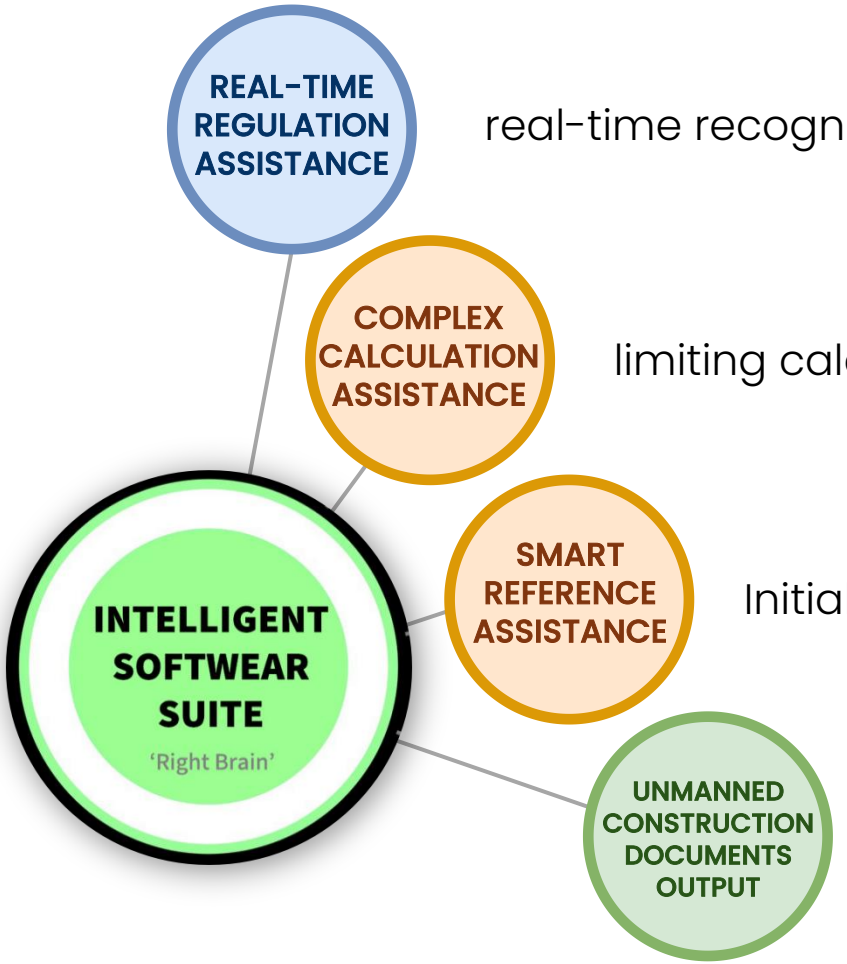
Hardware

北京城建亚泰建设集团有限公司
BEIJING URBAN CONSTRUCTION YATAI GROUP CO.,LTD

Beijing Urban Construction Yatai Group

Smart Architectural Design System

This design system is a comprehensive system that combines multiple software and hardware components to provide intelligent building design support. The system includes 3 components:

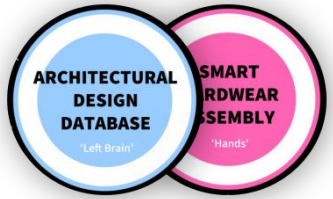


real-time recognition of the lines, shapes, and annotations

limiting calculations / sunlight, wind analysis / drawing information

Initial stage/Conceptualization phase/Drawing stage/After scheme

"input-output" process

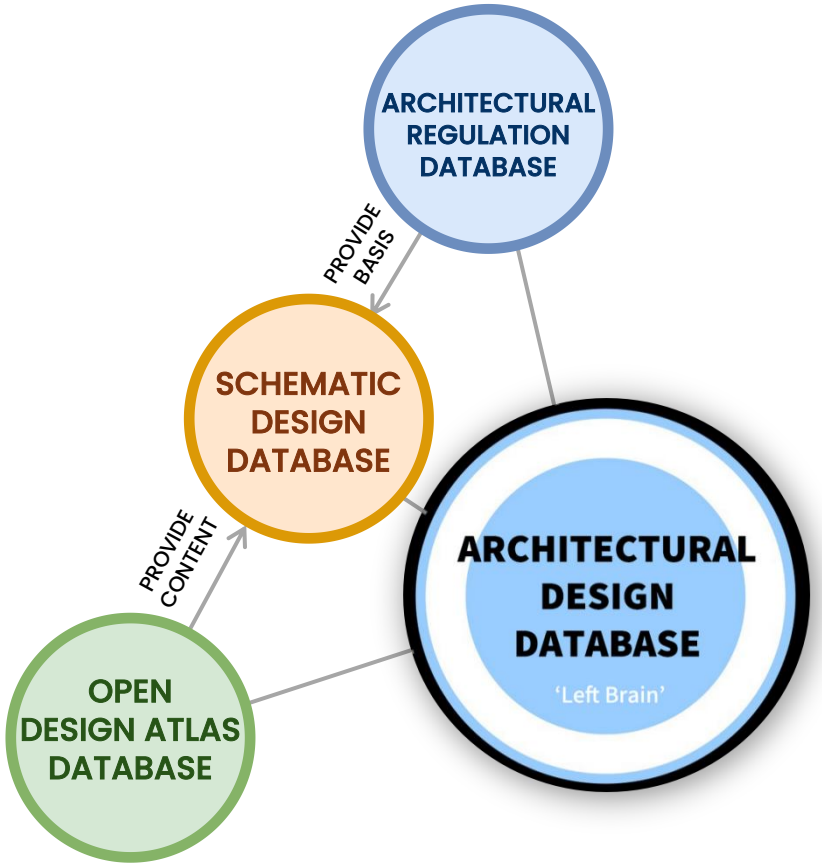


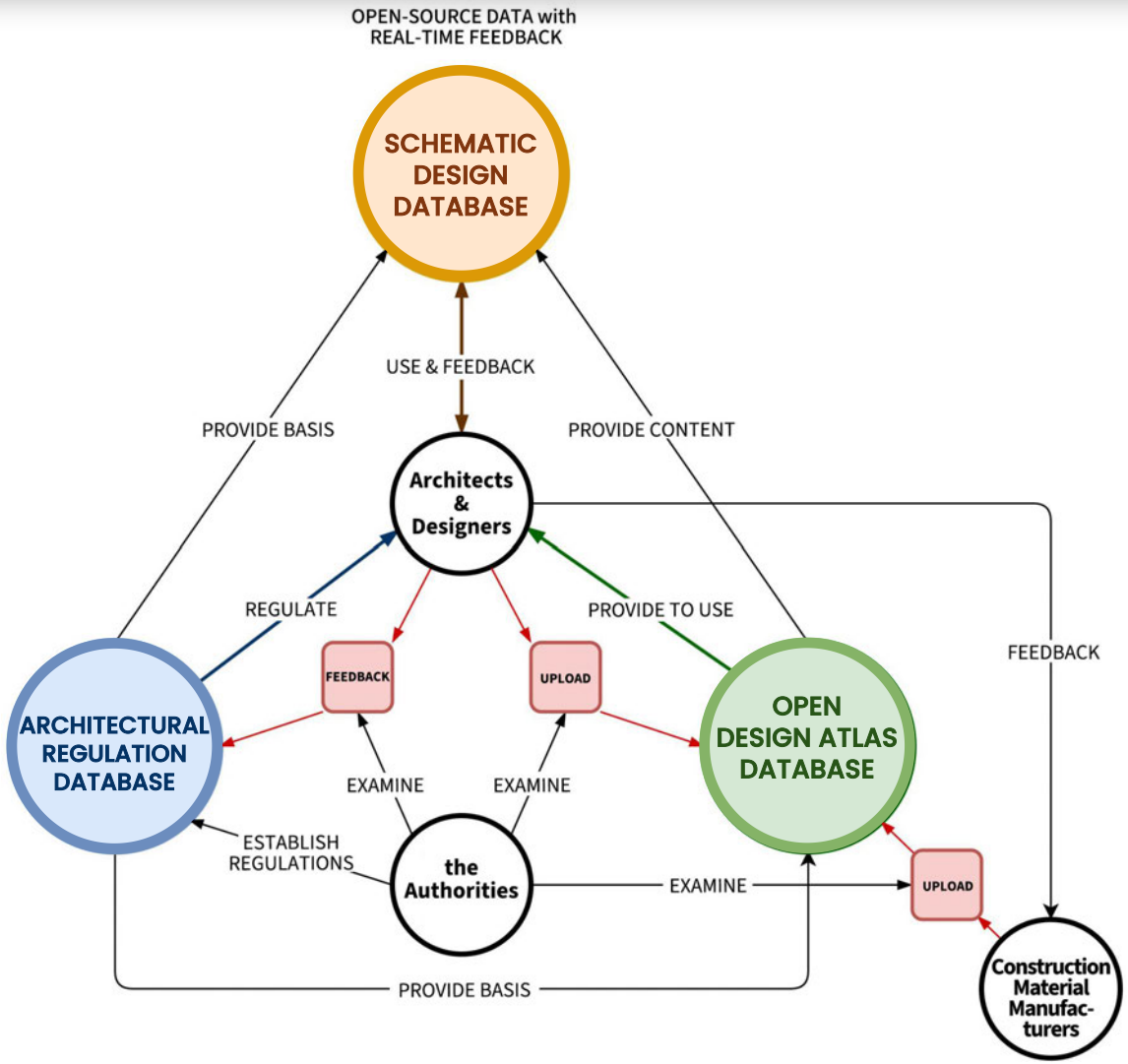
Schematic Design Database

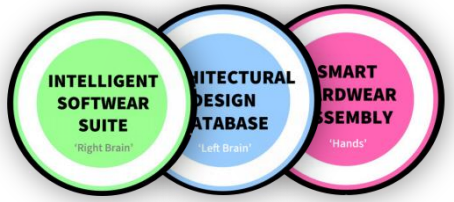
① Architectural Space Database

② Architectural Circulation Database

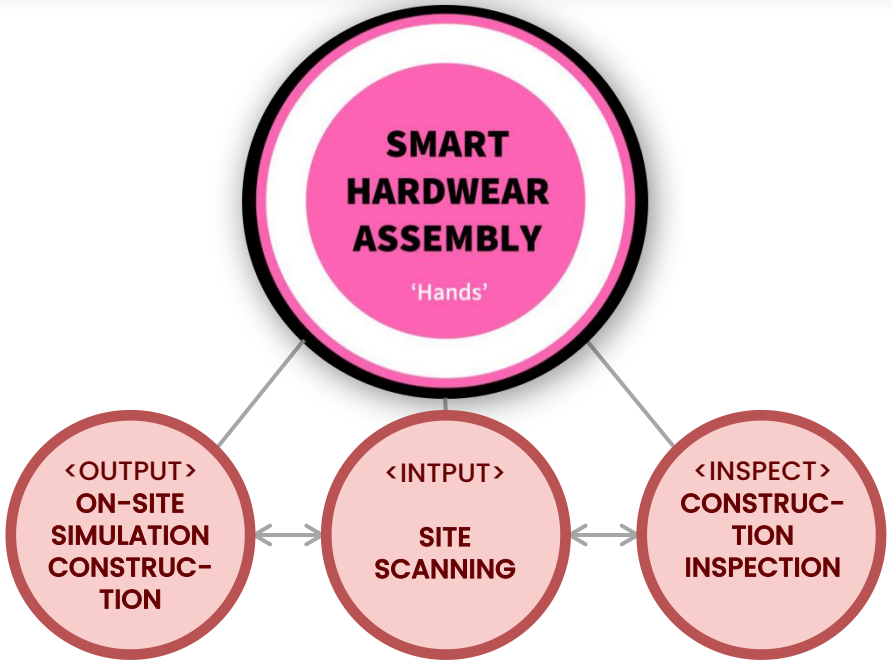
③ Residential Layout Database

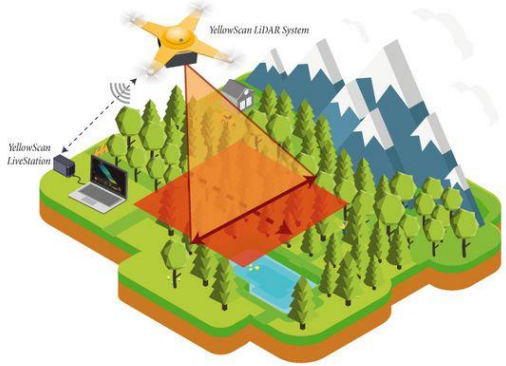



OPEN-SOURCE DATA with REAL-TIME FEEDBACK
SCHEMATIC DESIGN DATABASE
USE & FEEDBACK
PROVIDE BASIS
PROVIDE CONTENT
Architects & Designers
REGULATE
PROVIDE TO USE
FEEDBACK
UPLOAD
ARCHITECTURAL REGULATION DATABASE
OPEN DESIGN ATLAS DATABASE
FEEDBACK
EXAMINE
EXAMINE
ESTABLISH REGULATIONS
the Authorities
EXAMINE
UPLOAD
Construction Material Manufac-turers
PROVIDE BASIS

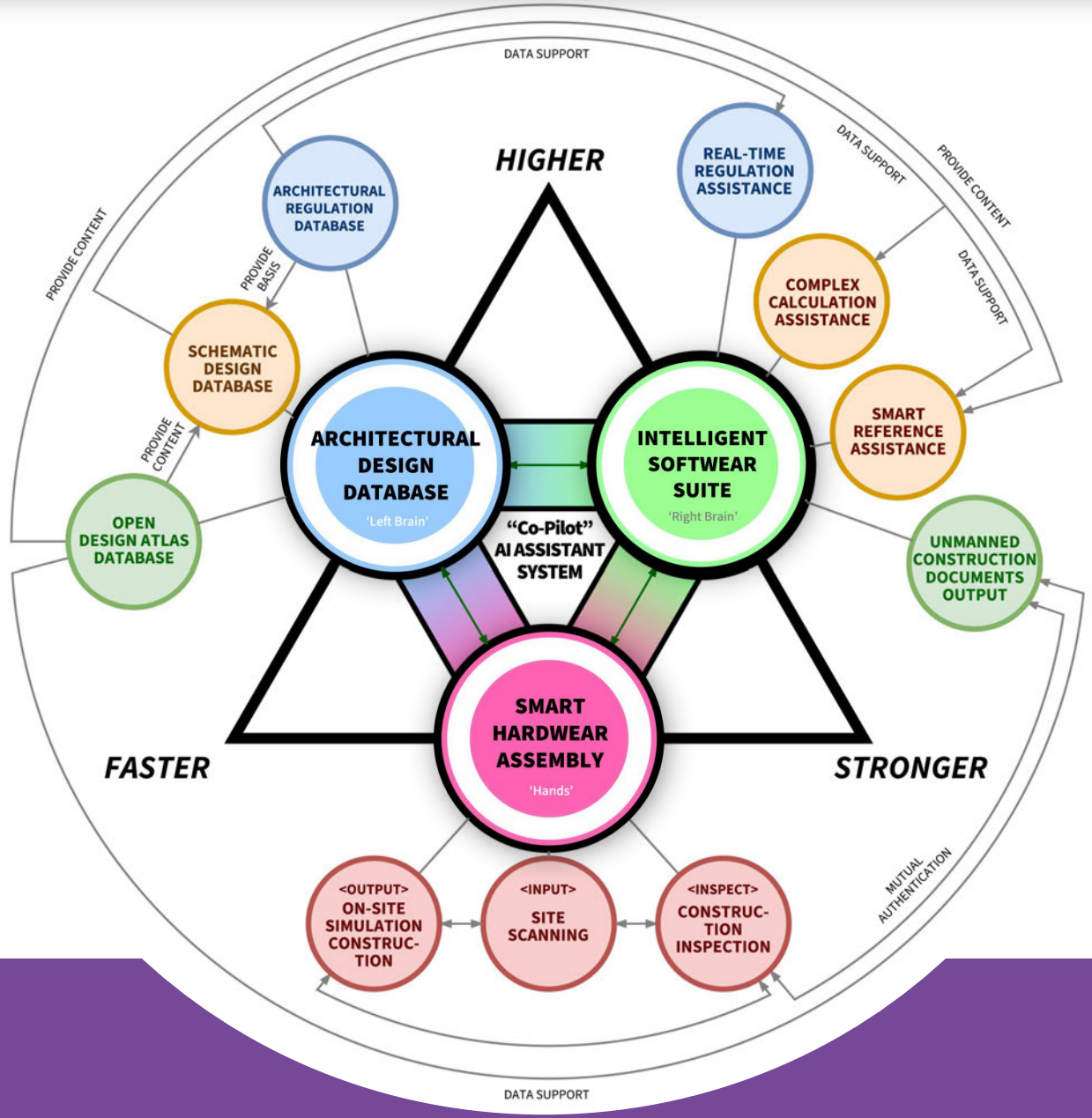

INTELLIGENT SOFTWEAR SUITE
'Right Brain'
'Left Brain'
'Hands'

gettyimages


SMART HARDWEAR ASSEMBLY
'Hands'
<OUTPUT>
ON-SITE SIMULATION CONSTRUC-TION
<INTPUT>
SITE SCANNING
<INSPECT>
CONSTRUC-TION INSPECTION


YellowScan LiDAR System
YellowScan LiveStation

INTELLIGENT SOFTWEAR SUITE
'Right Brain'
HITECTURAL DESIGN ATABASE
'Left Brain'


DATA SUPPORT
HIGHER
ARCHITECTURAL REGULATION DATABASE
REAL-TIME REGULATION ASSISTANCE
PROVIDE CONTENT
DATA SUPPORT
PROVIDE BASIS
COMPLEX CALCULATION ASSISTANCE
DATA SUPPORT
SCHEMATIC DESIGN DATABASE
SMART REFERENCE ASSISTANCE
PROVIDE CONTENT
ARCHITECTURAL DESIGN DATABASE
'Left Brain'
INTELLIGENT SOFTWEAR SUITE
'Right Brain'
OPEN DESIGN ATLAS DATABASE
"Co-Pilot" AI ASSISTANT SYSTEM
UNMANNED CONSTRUCTION DOCUMENTS OUTPUT
SMART HARDWEAR ASSEMBLY
'Hands'
FASTER
STRONGER
<OUTPUT> ON-SITE SIMULATION CONSTRUC-TION
<INPUT> SITE SCANNING
<INSPECT> CONSTRUC-TION INSPECTION
MUTUAL AUTHENTICATION
DATA SUPPORT

Limitations

The study is a theoretical prototype focused on addressing the specific challenges faced by architects in Mainland China's market.

Future work

Using architectural design as an example, its data-sharing logic and optimization methods can benefit other engineering design specialties.

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Ying Nie Associate Professor / Ph.D / Doctoral Advisor

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Reimagining food delivery: Designing towards a fairer platform

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fangzhou.you@york.ac.uk

Abstract

Food delivery applications (FDAs) represent a gig work platform that challenges traditional labour structures and impacts the digital wellbeing of individuals. Whilst FDAs provide convenience for customers, they raise significant ethical challenges, such as algorithmic control, which have led to social conflicts among delivery riders, customers and restaurants. These conflicts often arise from issues including AI-powered route planning and order prioritisation, unrealistic time expectations and a lack of transparent dispute resolution processes. Addressing these issues requires a holistic and ethically grounded redesign of FDAs that considers the needs of all stakeholders. This study conducts a scoping review to explore the impact of current FDA designs on three key stakeholder groups and identifies design opportunities for creating fairer FDAs. The findings aim to inform ethical design practices that prioritise fairness, digital wellbeing and stakeholder satisfaction.

Research Objectives

The scoping review aims to answer the research question: **How can FDAs be ethically designed to addressing social conflicts amongst customers, restaurants and delivery riders**. The objectives of this research include:

1. Explore how existing food delivery applications affect customers, restaurants, and delivery riders in a perspective of digital ethics, focusing on social conflicts, stakeholder wellbeing and algorithmic control.
2. Identify knowledge gaps in understanding the ethical and practical implications of ethical FDA design tools within the Human-Computer Interaction (HCI) domain.
3. Provide recommendations for redesigning FDAs to prioritise fairness, well-being, and satisfaction for key stakeholders, contributing to digitally ethical FDAs design practices.

Methodology & Process

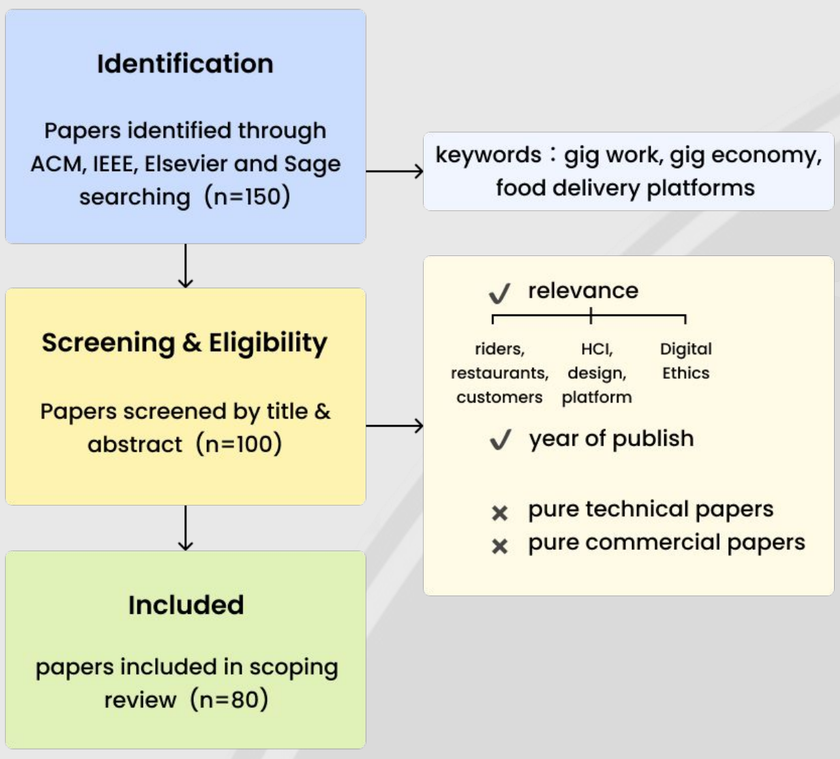

Figure 1. PRISMA flowchart of paper selection process

This scoping review followed the PRISMA framework, beginning with the identification of 150 papers through database searches (ACM, IEEE, Elsevier, Sage) using keywords such as ‘gig work’, ‘gig economy’, and ‘food delivery platforms’. Titles and abstracts of 100 papers were screened for relevance to topics like riders, restaurants, customers, HCI, design, platforms, and digital ethics, whilst ensuring latest publications. Purely technical or commercial papers were excluded. Finally, 80 papers were included for review, providing a comprehensive foundation for examining the ethical design dimensions of FDAs.

Findings: Ethical Design of FDAs

Ethical concerns in FDAs arise from the interplay of labour practices, customer expectations, and platform accountability, challenging the equitable treatment of key stakeholders. The ethical design of FDAs is crucial not only for addressing the negative impacts caused by these platforms but also for offering ethical guidance in the context of digital gig work platforms.

The findings of this research suggest the ethical design of FDAs must factor in the aspects of:

1. Algorithmic control over delivery riders and customers
2. Managerial control over restaurants
3. The need for the development of ethical FDAs design guidelines

In summary, further investigation is required into design recommendations for mitigating key stakeholder conflicts in the field of HCI study. Figure 2 outlines the work in progress, where researchers focus on reducing the negative impacts of algorithmic and managerial control, as well as labour relations in FDAs, by providing a set of ethical design guidelines.

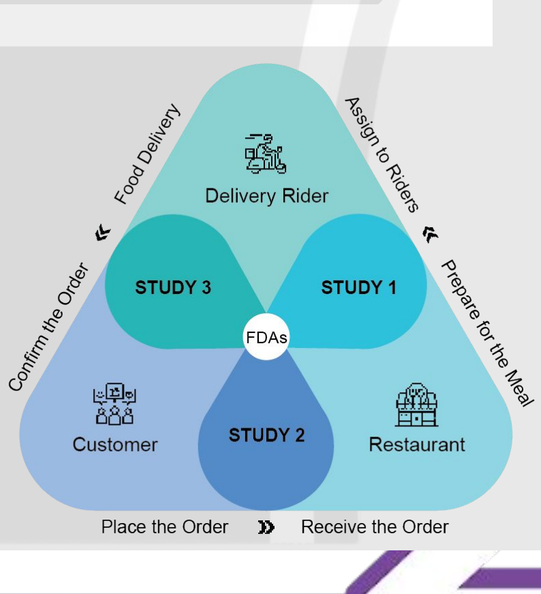

Figure 2. Research design for further investigation

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Tag Writing Method for LoRA Model Training Under The Cross-Cultural Background: A Case Study of New Chinese Yunjian

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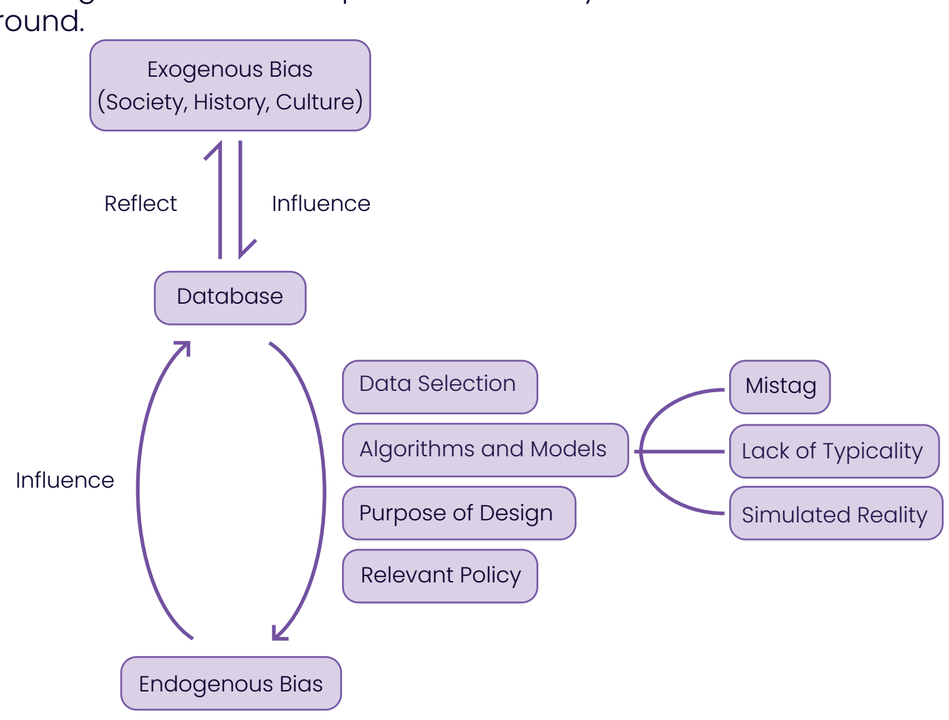
Abstract

Research has found that there is a significant lack of cultural representation in generative artificial intelligence. The data used to train AI primarily comes from Western developed countries. It means that a lot of of data comes from Chinese Internet are overlooked. As a result, the generated content cannot meet the needs of users with different cultural backgrounds. In the field of Natural Language Processing (NLP), it is widely acknowledged that biases may stem from five main factors: data, annotation process, input representation, model, and research design. As an open-source project, Stable Diffusion provides transparency by offering its architecture, code, and training data. Its openness allows users to understand the functionality and potential deviations of the model. LoRA is a low-rank adaptation method for large language models(LLMS). Users can customize LoRA models to meet their own needs. Training LoRA models for targeted subjects to absorbe diverse data to improve AI's understanding of different cultures, it may help bridge the gap between databases and specific cultures.
This study took "Yunjian", a unique shoulder ornament in traditional Chinese costumes, as an example. There was a significant imbalance in the representation of global cultures from AIGC database sources and algorithm design. Automatic tagging tools often generated a large number of invalid tags when tagged images. The wrong tags caused errors in algorithm learning. The authors proposed a tag writing framework based on the intrinsic characteristics of Yunjian. Through experiments, it was found that the effective tags are selected by using the framework. It made the details fit the form of Yunjian better and the generation effect more in line with the user's needs. By training a specifical LoRA model for Yunjian to increase the diversity of the data, which may reduce biases in AI-generated content and open up new possibilities for the application of AIGC across different cultures.

Research Objectives

The purpose of study is to control the data selection and tagging process in the LoRA training model to make the generation effect more applicable to Chinese cultures, so as to reduce the errors caused by cultural bias in artificial intelligence generation and explore the usability of AIGC in the cross-cultural background.



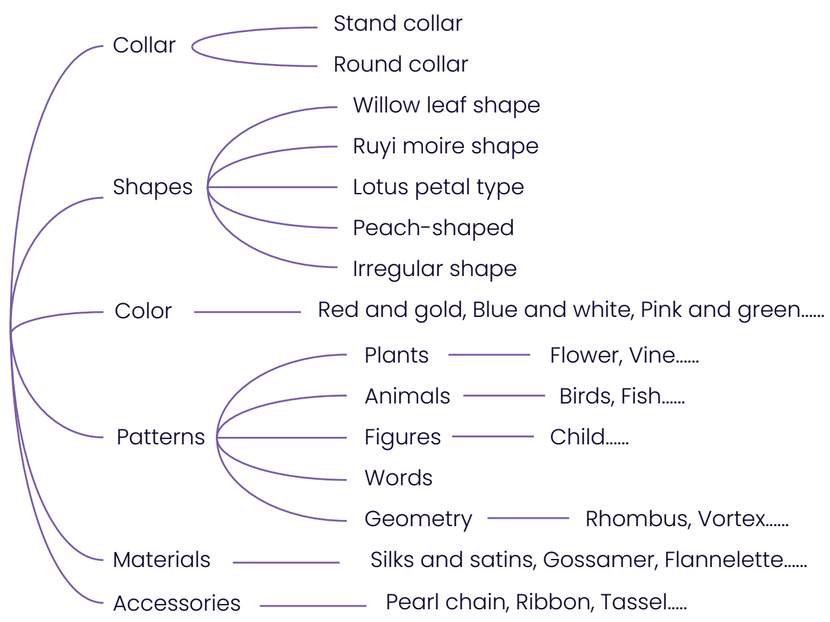
The Mechanism of Bias in Generative Artificial Intelligence

Methodology and Tools

This study used the empirical research method and used Stable Diffusion to train LoRA model for comparative experiments.
Stable Diffusion is a potential diffusion model that generates specific images from text descriptions with high stability and low computational complexity. It reduces the training cost but maintains excellent image generation performance. Low-Rank Adaptation (LoRA) is a method for large language models, reducing the barrier of model training and broadening the scope of output, which efficiently generates the target image using a small amount of data with a low-rank matrix.

Research Process

The authors divided tag writing into six sections according to characteristics of Yunjian, and summarized more detailed descriptors on this basis.

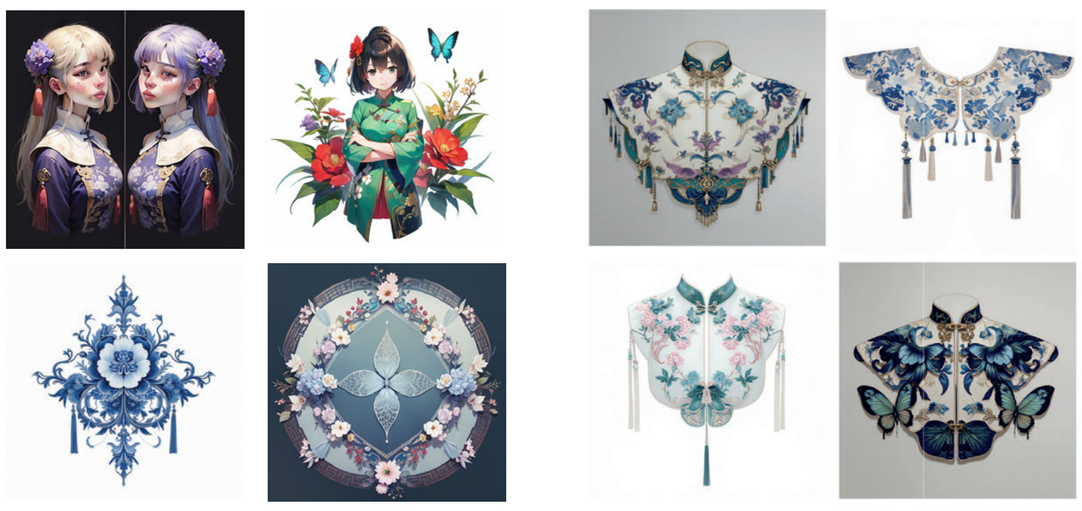


Comparison between Automatically generated tags and designed tags:

	Automatically Generated Tags	Designed Tags
	closed eyes, flower, from side, full body, gem, grey background, long hair, profile, snowflakes, standing	Yunjian, Chinese style, symmetric structure, white background, no avatar, round collar, irregular flowered margin, light blue and white, oriental cherry pattern, organza material, pearl chain, tassel
	artist name, beads, bell, gem, grey background, simple background, solo, tassel	Yunjian, Chinese style, symmetric structure, white background, no avatar, round collar, lotus petal shape, red and gold, peacock feather pattern, embroidery, tassel

Expected/Obtained Results

The authors tagged 200 cropped images of Chinese Yunjian using the two aforementioned methods and conducted model training. By inputing the prompts "Yunjian, Chinese style, symmetric structure, butterfly shape, flower, tassels, red/blue/green, satin material, white background, and no avatar" to teste two models. It was found that the LoRA model trained with automatic tagging tool could only learn the symmetric structure and Chinese patterns from the training set but failed to generate the unique shape characteristic of Yunjian. It even produced images of people that were completely out of character. In contrast, the tag framework constructed with careful design enabled the algorithm to more accurately learn the distinctive features of Chinese Yunjian from the training set.



Images generated from LoRA model through automatic tagging tools

Images generated from LoRA model trained by tag writting framework basedon the characteristic of yunjian

The Anticipated Impact of The Contribution

This research contributes significantly to discussions on cross-cultural adaptation in AI-generated content, presenting a practical framework for effective tagging in culturally specific design applications.
From a practical perspective, completely eliminating data bias is Extremely difficult. This requires coordination from all sides of society. However, for designers, training LoRA models with diversified data and fine-tuning large language models is an effective and simple approach to mitigate these issues.

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Towards a Human-made design. AI and high added value craft.

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ABSTRACT

In a rapidly evolving technological landscape, artificial intelligence (AI) has transformed creative processes, fostering aesthetic standardization that contrasts with human craftsmanship's uniqueness. While AI expands access to visual creation, it often dilutes artistic individuality, raising questions about authorship and originality. In response, there is a renewed interest in artisanal design, which values imperfection, authenticity, and emotional depth. This research explores the intersection of AI-generated aesthetics and craftsmanship, proposing a balanced approach that integrates technological efficiency with manual expressiveness. Through case studies and interviews, it examines how design students, professors and professionals can preserve their creative identity in AI era.

RESEARCH OBJECTIVES

1. Analyze the impact of AI on the creation and perception of handcrafted design in Europe.
2. Evaluate the evolution of e-commerce in the craft and graphic design sectors.
3. Compare the client's experience in small design ateliers.
4. Examine the relationship between design customization and customer loyalty.
5. Propose the integration of AI tools in the design process, ensuring a balance between technological efficiency and human creativity.

METHODOLOGY

1. Review of theoretical background.
2. Practical comparison between AI and handcrafted styles.
3. Aesthetic and formal comparison.
4. Evaluation of the creative process.
5. Analysis of user and designer experiences.
6. Surveys students and professors

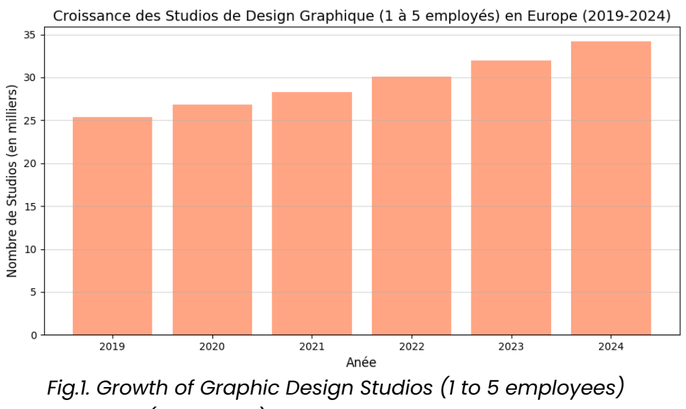

Fig.1. Growth of Graphic Design Studios (1 to 5 employees) in Europe (2019-2024)

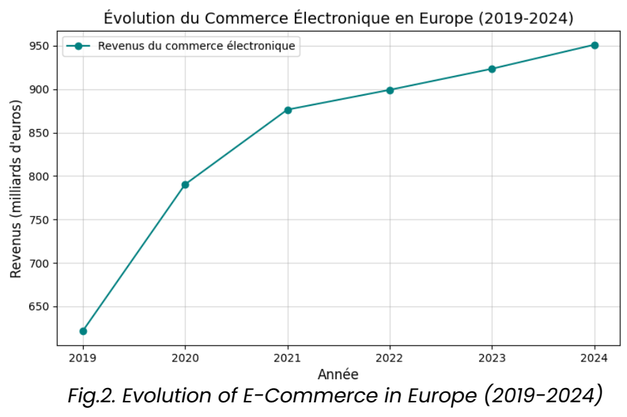

Fig.2. Evolution of E-Commerce in Europe (2019-2024)

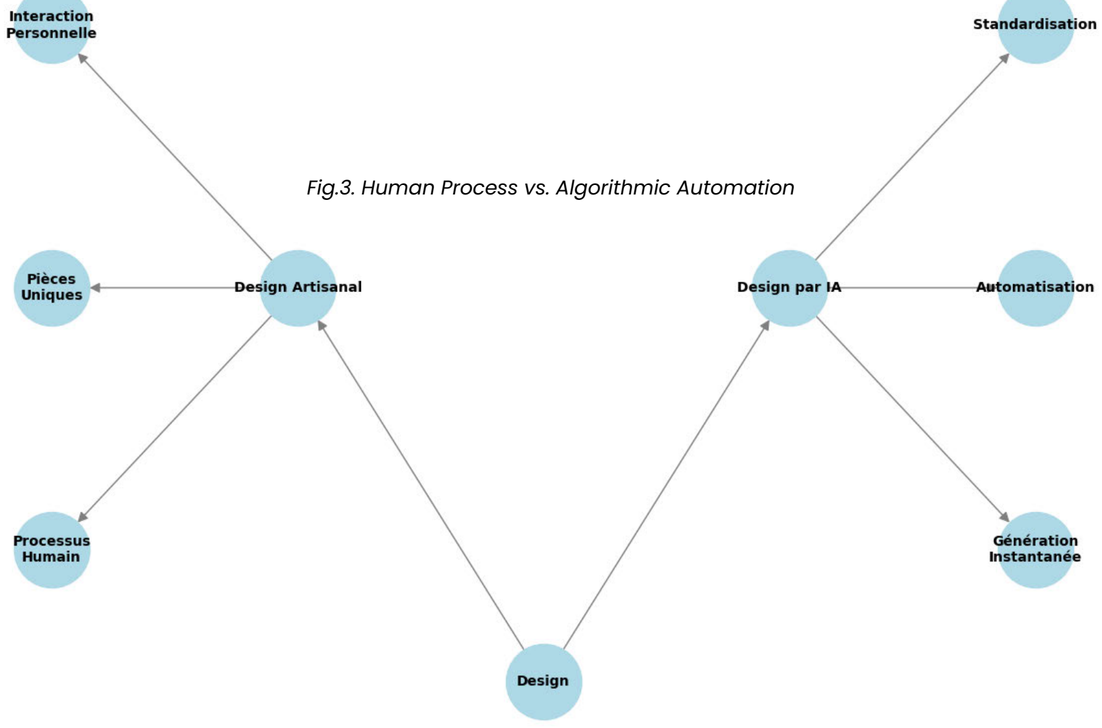

Fig.3. Human Process vs. Algorithmic Automation

RESEARCH PROCESS

1. **Theoretical background review.** The evolution of AI in design. Growth design studios (1-5 employees) analysis and market trends were also examined. (Fig. 1 and 2)
2. **Practical comparison between AI and craft. Hybrid Design Process** (Fig 5.)
2.1 **Analysis of EASD Castelló students' creations.** Ceramics, illustration, and graphic design.
2.2 **Experimental workshop EASD Castelló.** Students completed exercises: one assisted by AI and no AI. (Fig.4)
3. **Analysis of User and Designer Experiences**.
3.1 **Surveys EASD Castelló Students and Professors.** 30 students and 30 teachers were surveyed about perception of AI

EXPECTED/OBTAINED RESULTS.

1. **Interaction as a Differentiating Factor.** (Fig. 3)
2. **Experiential Value vs. Material Value.** Turning the acquisition into a emotional experience.
3. **Experience as Social and Spiritual Capital.** Access to enriching experiences in ateliers reflects a cultural and emotional identity, surpassing material accumulation.
4. **A Relationship Based on Trust and Recognition.** The client forms a deep relationship with the designer
5. **Uniqueness vs. Standardization.** Handcrafted design stands out for its uniqueness and emotional connection, while AI generates standardized products.
6. **Human Process vs. Algorithmic Automation.** Atelier design is human, with imperfections and evolution, while AI produces instant designs without narrative or interaction. (Fig. 3)
7. **Emotionality vs. Functionality.** Handcrafted design conveys emotions and stories, while AI creates visually impactful products but lacks emotional depth.
8. **Active Client Participation vs. Passivity.**

Bibliography

Fig.4. Hybrid Design Process in Artistic Ceramics by student Alexandru Viorel Vircu. 1) AIstorming. 2) Sketches. 3) Thrown ceramic pieces. 4) Ceramic glaze

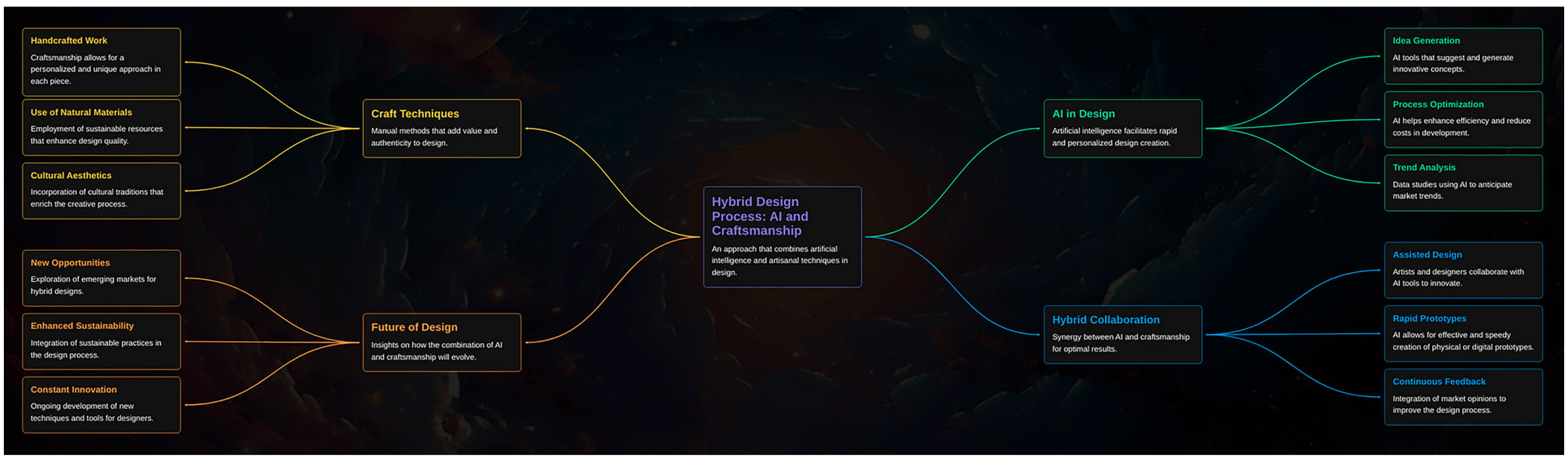

Fig.5. Mindmap. Hybrid Design Process: AI and Design/Craftsmanship

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TOWARDS ETHICAL AND INTUITIVE AI: A FRAMEWORK FOR PERSONALITY-CENTRIC AI INTERACTION.

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ABSTRACT | The integration of artificial intelligence (AI) in conversational agents (CAs) has become increasingly prominent across various industries, including human resources. While the anthropomorphization of AI is often seen as an enhancement of user interaction, ethical concerns related to its design remain significant.
This paper proposes a comprehensive framework for designing the personality of CAs based on four key components: brand mission and values, user needs, the agent's role, and an appropriate personality model. By focusing on these aspects, the proposed framework aims to create conversational agents that not only align with brand identity but also foster positive user experiences. The study uses the "Big Five" personality model as a foundation for mapping out the traits that should be incorporated into the CA design. Additionally, this research explores the ethical implications of anthropomorphic AI and its potential impact on users. Through interviews, personas, and user scenarios, the framework aims to offer guidance for designing more intuitive, empathetic, and ethically responsible CAs.
Anthropomorphization refers to attributing human characteristics to non-human entities, such as CAs, and it has been central to the development of AI interfaces. This concept has been integral to AI design since the Turing Test, which was developed to evaluate a machine's ability to mimic human intelligence. Today, CAs are designed to emulate human-like interactions, utilizing natural language processing (NLP) and social rules that replicate human-to-human interactions. Research within the "Computers Are Social Actors" (CASA) paradigm suggests that, despite knowing CAs are not human, users often treat them as such, applying similar social expectations. This blurring of lines between human and AI interaction raises ethical concerns, particularly around trust and the

psychological impact of interacting with highly anthropomorphized agents.
To address these challenges, this paper proposes a framework to guide the design of CA personalities, ensuring they are aligned with both the brand's identity and user expectations. The framework is structured around four key components: the brand's mission and values, a deep understanding of user needs, the CA's role, and an appropriate personality model. These elements ensure that the CA's personality is consistent with brand objectives while enhancing user experience and trust.

1. Brand Mission and Values: A CA's personality must reflect the core values and tone of the brand it represents. Analyzing the brand's mission ensures that the CA embodies the right personality traits that reinforce brand identity.
2. User Needs: Understanding user goals and frustrations is key to tailoring the CA's personality. Through user research and persona development, designers can identify personality traits that align with user expectations and alleviate common pain points.
3. CA's Role: The CA's social role, whether it acts as a guide, assistant, or motivator, shapes the appropriate personality traits for the system. This allows the CA to maintain an appropriate dynamic with users, even when their personality profiles may differ.
4. Personality Model: The Big Five personality model (OCEAN: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism) is employed to map out the CA's traits systematically. This model provides a comprehensive framework for designing nuanced, human-like personalities while maintaining consistency with brand identity.

By following this framework, organizations can create conversational agents that are not only functional but also embody ethical considerations, particularly in terms of user trust and the psychological effects of interacting with human-like machines. The proposed framework addresses both practical challenges in CA design and broader ethical implications, ensuring that AI technologies remain aligned with human values.

KEYWORDS | AI ETHICS, CONVERSATIONAL AGENTS, PERSONALITY DESIGN, DESIGN ETHICS,

1. Introduction

The integration of artificial intelligence (AI) in conversational agents (CAs) has become increasingly prominent across various industries. Since its inception in the 1950s, AI has evolved significantly, multiplying its uses and application domains.
While the anthropomorphization of AI is often seen as an enhancement of user interaction, ethical concerns related to its design remain significant. Anthropomorphization refers to attributing human characteristics to non-human entities, such as CAs, and it has been central to the development of AI interfaces. This concept has been integral to AI design since the Turing Test, which was developed to evaluate a machine's ability to mimic human intelligence. Today, CAs are designed to emulate human-like interactions, utilizing natural language processing (NLP) and social rules that replicate human-to-human interactions. Research within the "Computers Are Social Actors" (CASA) paradigm suggests that, despite knowing CAs are not human, users often treat them as such, applying similar social expectations. This blurring of lines between human and AI interaction raises ethical concerns, particularly around trust and the psychological impact of interacting with highly anthropomorphized agents.
From a Weberian perspective of the ethics of responsibility (Hottois, 1996), questioning the impact of AI on its users is a moral inquiry, akin to corporate social responsibility (CSR). The design choices of AI (Esteban, 2020) notably direct the impact of this technology: usage functions, support platform, type of AI, etc. Amazon's selection algorithm, which excluded female

designations, is notoriously emblematic (Black & Esch, 2020) and illustrates the potentially deleterious consequences of an AI whose ethical implications are poorly thought out. The anthropomorphic design of certain AIs has a particular influence on users (Cherif & Lemoine, 2019; Przegalinska et al., 2019) and thus constitutes an important dimension to address the ethical questions in this field.
To address these challenges, this paper proposes a comprehensive framework for ethically designing the personality of CAs based on four key components: brand mission and values, user needs, the agent's role, and an appropriate personality model. By focusing on these aspects, the proposed framework aims to create conversational agents that not only align with brand identity but also foster positive user experiences.

2. Litterature review

Conversational agents are computer programs that interact with users using natural language (Masure, 2015). They fulfill a need for companies to embody themselves to users, allowing users to feel understood and supported in their endeavors, even in the absence of a physical agent. Trends show that companies are rapidly implementing CAs within their services. However, consumers should not be forced to adopt solutions that do not improve efficiency, effectiveness, or satisfaction compared to traditional systems (Black & Esch, 2020).
Artificial intelligence (AI) enhances conversational agents by smoothing dialogues, adding coherence and fluidity to the user experience, and creating the illusion that the user is conversing with a human (Cherif, 2016). After examining results that demonstrate the robust functioning of social rules in human-computer interaction (HCI), it seems natural to make the interface more human, conforming to the predominant social expectations of users.
The idea that people treat computers as if they were human (Nass & Brave, 2005; Nass & Moon, 2000; Reeves & Nass, 1996) has received consistent empirical support by using a wide range of social rules observed in human-human relationships. This research paradigm, known as "Computers Are Social Actors" (CASA), indicates that although people know that computers do not justify social treatment, they tend to apply social expectations and exhibit the same responses to computers as to human interactions.

Conversational agents are often attributed human characteristics, including gender, face, and personality. Gender, in particular, creates expectations that impact users' experiences with the agents. Research on the gender affordances of conversational agents shows that users more frequently attribute negative stereotypes to female CAs than to male CAs. Female CAs are more often subject to implicit and explicit sexual attention and abuse (Przegalinska et al., 2019). Gender stereotypes tend to affect relational (style) interaction more than referential (content) interaction. For example, when computer gender manifested in sexually marked cartoon characters, participants were more likely to accept suggestions from a male computer for sports and vice versa for fashion anecdotes (Lee, 2003).
Beyond gender, anthropomorphism can benefit the perception of personality. CAs with a high level of humanity increase trust and familiarity, offering a more natural interaction with humans. This is because humans know how to interact with other humans and will assume a CA will interact like a human if it has a more human appearance. However, research has shown that being too human-like can have a negative effect on human perception, a phenomenon known as the "uncanny valley" (Mori, 1970). Empirical research has not consistently supported this intuitive notion (Dehn & van Mulken, 2000), raising questions about how human attributes of the interface modify how people interact with a computer. For example, when do anthropomorphic interfaces elicit more positive or negative reactions from users than their mechanomorphic counterparts? Are there individual differences in how people react to more or less human-like interfaces? Although the tendency to anthropomorphize computers is considered quite universal within the CASA tradition, some researchers have examined how various anthropomorphic qualities of the interface affect user responses. Sproull, Subramani, Kiesler, and Walker (1996), for example, used a computerized career counseling system that presented its results via simple text display or a talking face. This research revealed that while auditory resemblance to humans did not make people more likely to exhibit social responses to flattering computers, it served as a peripheral cue that significantly improved users' evaluations of the computer's performance and compliance

with the computer's suggestions among people with chronic illnesses.
Finally, a study revealed that the personality of CAs had a significant positive effect on user experience with virtual interfaces, but this effect depends on the context, the task performed, and the user group. Humans have bodies, feelings, emotions, personalities, and behaviors that all influence how we communicate, behave, and interact. CAs must be able to simulate these skills to be perceived as more than a computer and become competent social actors. Similarly, just as people are more attracted to similar others than to dissimilar ones (Byrne, 1971), when the "personality" of the computer was implicitly conveyed through textual cues, participants responded more favorably to the computer whose personality matched their own (Moon & Nass, 1996). Dominant users preferred a dominant computer that displayed greater self-confidence and used more assertive language, while submissive users found the interaction more satisfying when the computer used tentative language expressing lower self-confidence.
Emotional intelligence, anthropomorphism, humanity, politeness, human etiquette, humor, and gender are important variables to consider when designing a CA because they are crucial for how users perceive it (Callejas et al., 2011; Xiao et al., 2005; McTear et al., 2016). However, user profiles are still rarely considered in the design of CA personalities, leading to low-quality interactions between CAs and users.
Designing CAs involves balancing human-like attributes with functionality to create effective and ethical interactions. The integration of AI and attention to ethical issues, such as anthropomorphism, are essential for the successful adoption of CAs across various contexts. Thus, in this paper, we question what role and tone should the avatar have to conform to the brand's communication performance requirements? What personality should the avatar adopt to meet user needs for emotional acceptability?

3. Hypothesis

In human interaction, we use several social cues that dictate our behavior and how we are perceived by our interlocutors. Fogg (2002) proposes that there are five main social cues:

1. **Physical:** Face, eyes, body, movement
2. **Psychological:** Preferences, humor, feelings, empathy
3. **Language:** Interactive use of language, spoken language, language recognition
4. **Social Dynamics:** Turn-taking, cooperation, praise, answering questions, reciprocity
5. **Social Roles:** Doctor, teammate, adversary, teacher, pet, guide

Our social interactions are dynamic. We reflect on and modify our behavior regarding our conversation partners. Our social role is another important factor that influences our behavior in different situations; we act differently if we assume the role of a parent than we would as a friend. We hypothesis that aligning the CA’s personality traits with social interaction principles will lead to more intuitive and ethically responsible AI-human interactions.

4. Designing the personality framework

Designing an effective and ethical personality framework for Conversational Agents requires a deep understanding of both users and brand identity. This framework must be rooted in user research, identifying their needs, frustrations, and expectations, while aligning with the brand’s mission, objectives, and values.
We believe that structuring the CA’s personality around four key components, designers can ensure an intuitive, user-centered, and ethically responsible AI interaction.

4.1. The four key components of the CA personality framework

Brand Mission, Objectives, and Values
To ensure consistency and coherence in user interactions, the CA's personality must align with the brand's identity. This involves analyzing and defining:

- **Mission Statement:** The brand's overarching purpose and goals.
- **Core Values:** Principles that shape how the brand interacts with users.
- **Tone of Voice:** The style and manner in which the brand communicates across platforms to maintain a consistent and familiar user experience (Cummings, 2017). A well-defined tone of voice helps users perceive the CA as an extension of the brand, fostering trust and engagement.

Understanding Users and Their Needs
A user-centered approach is fundamental to designing a CA personality that meets expectations and enhances interactions. Understanding users involves:

- **User Research:** Conducting primary and secondary research, including semi-structured interviews, surveys, and ethnographic studies.
- **User Personas:** Developing detailed personas based on research findings to summarize users' motivations, frustrations, and specific needs (Benyon, 2014).
- **User Scenarios:** Mapping out realistic interactions that the CA will handle to ensure it provides value and solves user pain points. By grounding the CA's design in user research, designers can create a personality that feels intuitive and empathetic.

Defining the Role of the CA
The CA's role dictates its expected behavior and personality traits. A well-defined role ensures:

- **Task Relevance:** The CA's function aligns with user expectations and brand goals.
- **Behavioral Expectations:** The CA exhibits behaviors appropriate to its role. For instance, a customer service CA must exhibit patience, helpfulness, and professionalism (Burge, 2016; Lipcamon, 2013).
- **Technical Considerations:** The CA's AI capabilities, NLP features, and API integrations influence how effectively it fulfills its role. Defining the role helps maintain consistency in interactions and user engagement.

Selecting an Appropriate Personality Model
To structure the CA's personality, a well-established framework is necessary. The **Big Five Personality Model** (OCEAN) is a widely accepted model for mapping personality traits and is particularly useful for linguistic interfaces (John & Srivastava, 1999). This model includes:

- **Openness:** Creativity, curiosity, and adaptability.
- **Conscientiousness:** Organization, reliability, and responsibility.
- **Extraversion:** Sociability, enthusiasm, and assertiveness.
- **Agreeableness:** Friendliness, empathy, and cooperation.
- **Neuroticism:** Sensitivity to stress and emotional stability. Each CA personality is designed by adjusting the balance of these five factors to match the brand identity and user needs.

Implementing and Testing the CA Personality Framework
Once the framework is defined, testing and iteration are crucial to refine and validate the CA's personality. This involves:

- **User Scenario Testing:** Evaluating how well the CA responds to real-world interactions.
- **A/B Testing:** Comparing different personality configurations to determine the most effective approach.
- **Feedback Loops:** Gathering user feedback to continuously optimize the CA's

personality. Through iterative testing, designers can ensure the CA delivers a seamless, engaging, and ethical user experience.

By integrating brand identity, user research, role definition, and personality modeling, the proposed framework provides a structured approach to designing CAs that enhance user interactions while maintaining ethical considerations. This methodology ensures that CAs are not only functional but also foster trust, engagement, and positive user experiences.
quotations within the text should be marked with double quotation marks: Lawson also has a broad understanding of design when he mentions: “Professional designers such as architects, fashion designers and engineers” (Lawson, 2004, p.5). Longer quotations of more than one line should be formatted as below, again within double quotation marks:

4.2. Designing a support tool for designing CAs

Based on the Big Five model, we have defined specific archetypes that brands can use as references. To achieve this, we drew inspiration from the MBTI test and its 16 archetypes, adapting them to the Big Five framework. We also renamed the archetypes to better align them with virtual assistant personalities.

Each archetype is characterized by a dominant personality trait from the Big Five. Each archetype has its own unique characteristics. It can be described through multiple categories that help designers create a virtual assistant that closely aligns with its personality. These categories serve as guidelines to ensure coherence in the assistant's behavior, tone, and interaction style. To structure the tool, a decision tree was developed based on the classifications to provide recommendations and suggest one or two archetypes that best match the responses given during the research protocol.

Steps of the Decision Tree:

1. **What is the context of use?**
2. **What are the main assistance traits?**
3. **What are the primary motivation traits?**

This structured approach helps designers select the most suitable archetype for their virtual assistant, ensuring alignment with user expectations and brand identity.

How It Works:

1. **Structured Questionnaire:** Designers check the boxes that best describe the assistant’s context, traits, and motivations.
2. **Automated Recommendation:** Based on the selected criteria, the tool suggests the most fitting archetype(s).
3. **Customization Options:** Designers can refine the recommendation to better match specific needs.

This approach simplifies the design process, ensuring that the virtual assistant’s personality aligns with user expectations and brand identity.

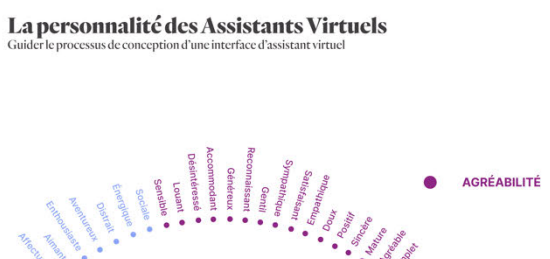

Figure 1. The design framework serves as a synthesis of the methodology needed to define the ideal archetype for a virtual assistant. By simply selecting the relevant options, the tool can recommend the most suitable archetype

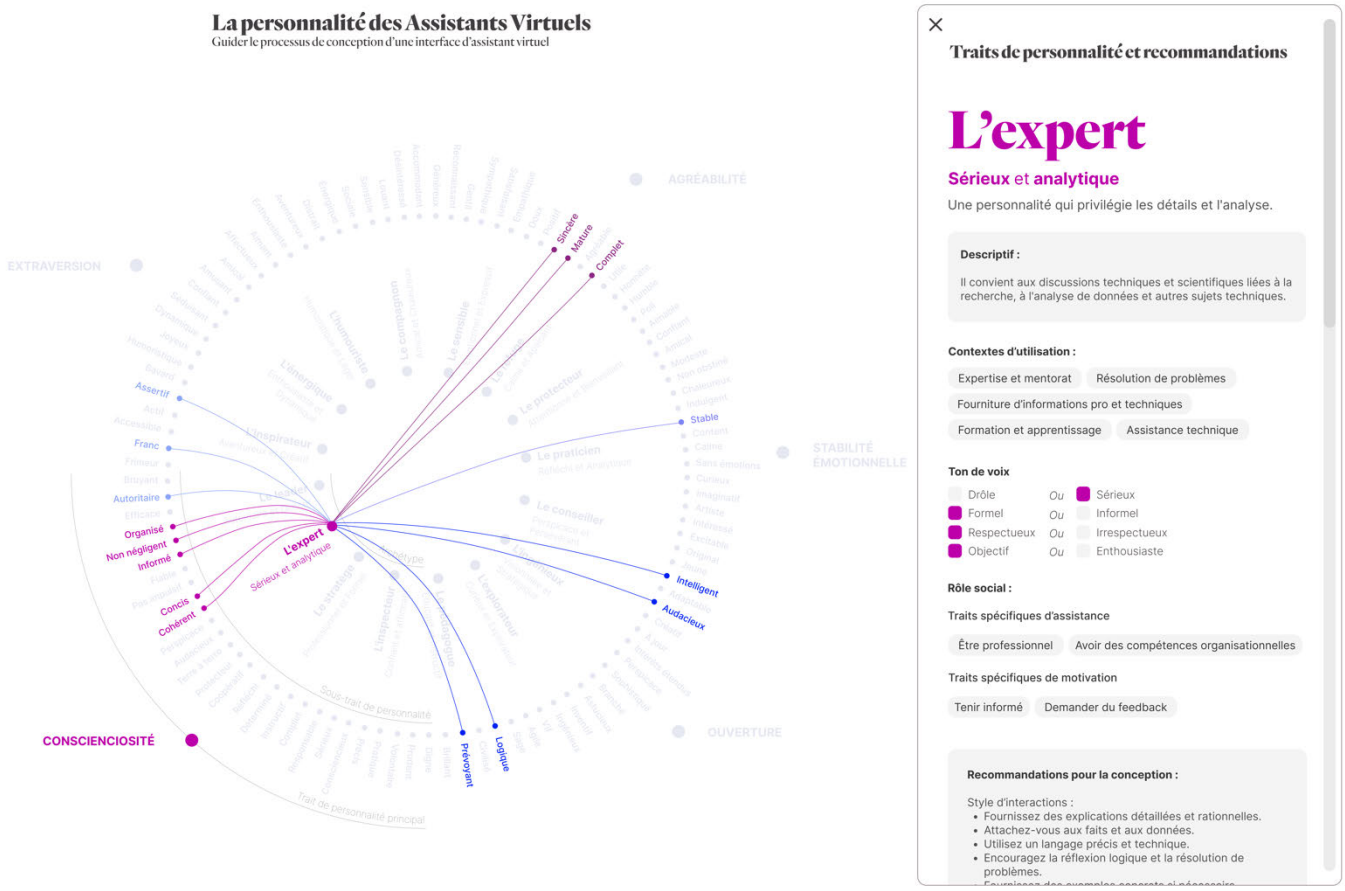

Figure 2. The archetype sheets compile all the essential elements needed to design a virtual assistant that aligns with the recommended archetype from the design framework. **Contents of an Archetype Sheet: Tone of Voice:** Defines the assistant's communication style (formal, friendly, authoritative, etc.).; **Social Role:** Outlines the assistant's function in user interactions (guide, advisor, companion, etc.). ; **Personality Traits:** Highlights key characteristics based on the Big Five model. ; **Design Recommendations:** Provides guidelines on dialogue flow, interaction style, and adaptability.

By using these sheets, designers can ensure consistency and coherence in creating a virtual assistant that embodies the chosen archetype effectively.

4.3 Design used case

We then conducted a workshop to hypothesized different use case to test this framework.

CAs for healthcare: While the AI improved patient adherence to treatment, feedback indicated the risk of emotional dependency, highlighting the need for clear disclaimers on the system's limitations. This emphasizes the importance of transparency and user education in healthcare applications to prevent over-reliance on AI systems.

CAs for education : An AI tutor, designed with an extraverted and agreeable personality model, led to increased student engagement. However, ethical concerns emerged about the potential for AI to replace human instructors, underscoring the importance of balancing AI with human interaction. AI in education should complement, rather than substitute, human teaching, ensuring students benefit from both human and AI elements.

CAs for customer service : A customer service CA, incorporating conscientious and agreeable traits, received positive feedback, with users reporting higher satisfaction. However, transparency issues arose, prompting adjustments to clarify the AI's decision-making process. Ensuring transparency in AI operations is vital to maintaining user trust and satisfaction in customer service environments.

5 .Discussion

Anthropomorphism in AI design is often motivated by the desire to enhance user experience. Human-like interactions make AI-driven conversations more intuitive, engaging, and relatable. Studies indicate that users perceive anthropomorphic agents as more credible and approachable, leading to increased satisfaction and cooperation (De Visser et al., 2016). By incorporating human-like traits such as empathy, humor, and politeness, CAs can create a more positive and memorable user experience. For instance, CAs like Apple's Siri and Amazon's Alexa have been designed with distinct personalities that reflect their respective brands, making interactions more enjoyable and fostering user loyalty.

Despite these benefits, the anthropomorphization of AI introduces several ethical dilemmas:

- **Trust and deception:** Users may develop an exaggerated sense of trust in CAs, potentially leading to misinformation or manipulation. The human-like appearance and behavior of CAs can create an illusion of understanding and reliability, which might not always be warranted given the limitations of AI (Nass & Moon, 2000).
- **Psychological dependency:** Vulnerable populations, including children and the elderly, may form unhealthy attachments to AI entities, leading to emotional reliance. This psychological dependency can have negative consequences, such as reduced human interaction and social isolation (Sharkey & Sharkey, 2012).
- **Privacy and data exploitation:** Anthropomorphic AI may encourage users to disclose personal information under the false impression of human-like empathy. This raises significant privacy concerns, as sensitive data could be exploited for commercial purposes or fall into the wrong hands (Zuboff, 2019).
- **Bias and discrimination:** Human-like AI systems risk perpetuating and amplifying societal biases embedded in training data. If not carefully designed and monitored, CAs can reinforce stereotypes and discriminatory practices, leading to unfair treatment of certain user groups (Noble, 2018).

These ethical challenges underscore the need for responsible AI design practices that prioritize user

well-being and fairness. Designers and developers must be vigilant in addressing potential harms and ensuring that CAs operate transparently and ethically.

While the anthropomorphization of CAs can significantly enhance user experience, it also necessitates careful consideration of ethical implications. By adopting a user-centered design approach and adhering to ethical guidelines, it is possible to create CAs that are both effective and responsible. It opens question that should be tackles by interdisciplinary teams of researchers in design, phychology, cognitive science to assess questions such as : should technology be designed to replicate human experience and emotional expressiveness ; Does personality type influence the preference for affective personal assistants? Does interaction with an emotionally aware agent influence user behavior?
We recognize that we have not yet conducted any evaluated user tests, and we view this as the next step in our research. A continuation of this project will involve evaluating the personality design system to further explore these new research directions.

6. Conclusion

Designing user-centered personalities for Conversational Agents requires a deep understanding of users' needs alongside a careful analysis of the brand's goals and values. The proposed framework, which integrates four core components with the five-factor personality model, provides a systematic approach for developing effective and ethically responsible CAs.

By prioritizing user needs, brand integrity, and ethical responsibility, we can thus create CAs that are not only effective but also trusted and respected by users. Continuous evaluation and adaptation will be essential to ensure CAs contribute positively across sectors like healthcare, education, and customer service.

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Author 1 add an author bio that describes research interests and main achievements in a maximum of 40 words. [LEAVE BLANK UNTIL FINAL ACCEPTANCE] [_P/RoD Author Bio and Acknowledgements]

Author 2 add an author bio that describes research interests and main achievements in a maximum of 40 words. [LEAVE BLANK UNTIL FINAL ACCEPTANCE]

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ethical leadership
a new frontier for design

Value-Driven Healthcare Design: A Card-Based Game for Identifying Design Values in Glaucoma.

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ABSTRACT

Values shape human actions and decisions, and technology both embodies and influences these values. Value-Sensitive Design (VSD) is a key approach to incorporating values into technology design but has been criticised for focusing on predefined moral values, limiting stakeholder engagement and flexibility. This is especially relevant in healthcare, where technologies are often reappropriated for unintended uses, leading to reinterpretations of designers' original intent. This poster presents a card-based methodology for identifying and reflecting on values in glaucoma diagnosis and treatment. Developed from interviews with ophthalmologists and co-designed with researchers and designers, the tool uses **value and scenario cards** to facilitate discussions on how values shape clinical practices and influence technology design. Tested in interdisciplinary workshops with ophthalmologists, HCI researchers, designers, data scientists, and philosophers, the method promotes **dynamic value prioritisation and bottom-up value elicitation**, ensuring healthcare technologies better align with diverse user needs and guiding the design of speculative prototypes.

OBJECTIVES

Healthcare technologies embody implicit value systems that shape clinical decision-making and patient experiences. However, these values evolve dynamically through interactions with technology, often in unforeseen ways (Manders-Huits, 2011; Van Der Weij et al., 2023). While VSD provides a structured approach to embedding values in design, it struggles to capture **emergent values** — values that arise during use and may not be adequately captured by predefined lists (Borning & Muller, 2012; Le Dantec et al., 2009).

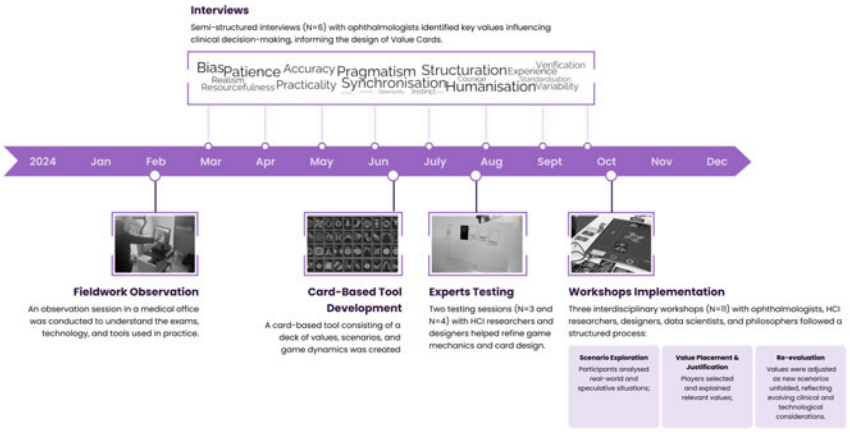
Technology can embody values and shape human behavior (Flanagan et al., 2008), making it necessary to develop **adaptive, stakeholder-driven methods** that capture evolving values in real-world contexts. The rise of AI further complicates this challenge, necessitating more context-sensitive methods for value identification (Umbrello & Van De Poel, 2021).

This project seeks to develop a **participatory method** to identify and reflect on values in glaucoma diagnosis and treatment. By integrating **ethnographic inquiry and participatory design**, we explore how values influence technology use and clinical decision-making. The project also examines **how AI-driven decision-support tools can better align with the values of ophthalmologists and patients.**

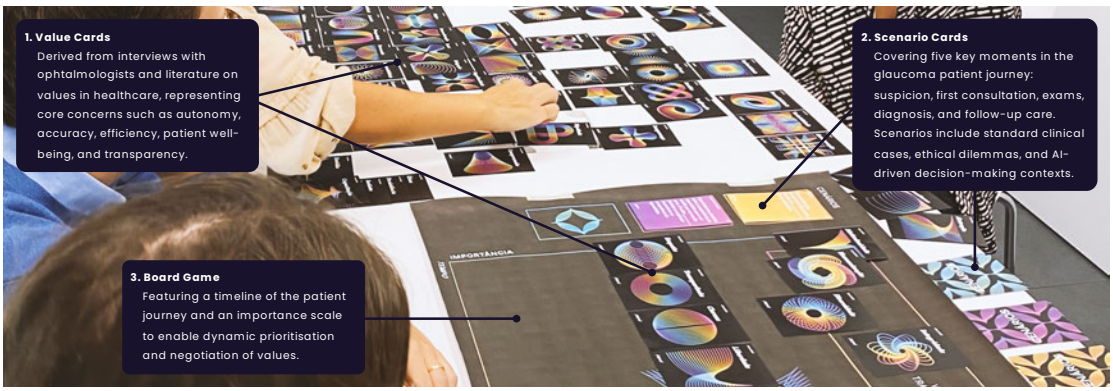
METHODOLOGY

The methodology involved developing a **card-based tool** informed by **ethnographic research, expert validation, and participatory workshops** to explore values in glaucoma diagnosis and treatment.

The following timeline describes the phases and activities of research, design, assessment and implementation of the game.



OUTCOMES



Key insights included: 1) **Tensions between efficiency and patient-centered care** in glaucoma treatment; 2) **Concerns about transparency and trust** in AI-driven decision-making; 3) **Differences in value prioritisation** among stakeholders.

The game facilitated **discussions on value trade-offs**, promoting bottom-up value identification and mapping stakeholder priorities. These insights inform the development of **AI and decision-support tools that align with real-world clinical practices and ethical considerations**.

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Chapter 4

FOOD TRANSITION

Food Serenity and Environmental Challenges

Track leader: Julia Kunkel
Food Design Lab director - L'École de design Nantes Atlantique

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ADDRESSING PRODUCT LONGEVITY THROUGH FOOD RESILIENCE

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ABSTRACT | **Twenty-five years ago, starting a journey into sustainable product design to address product obsolescence, the answers to complex sustainability challenges, including regenerative design or a Mutualistic Society, were difficult to come by. Today, solutions can be found through the study of Permaculture Design, thanks to the movement's founders Bill Mollison and David Holmgren. In the 1970s, they promoted harmony with nature by establishing a philosophical system of sustainable living, design and land use founded in ecological energy theory. Following this philosophy, starting in 2008, we began training numerous community members in these practices. However, by 2011 we recognized the need to supply students and communities with perennial edible plants, beyond mail-order nurseries, which have limited availability and sizes, or large national stores that sell well-known cultivars that are unfortunately highly disease and pest-prone in the region. Founding a nursery that would supply perennial plants for food forests, edible landscaping, or public forage gardens in an urban rust belt city of one million people was necessary. Perennials allow the gardener to minimize work while maximizing yield versus high work annual farming or gardening (Hemenway, Gaia's Garden: A Guide to Homescale Permaculture, 2009). This resulted in the launch of a low-cost, not for profit, edible perennial nursery called Growing Value, specializing in disease and pest-resistant cultivars, which includes native plants for the region, increasing urban food resilience with little effort to obtain a yield year after year because it was designed with nature from the start (Jacke, 2005) (Weisman, 2014). From a design standpoint, this was a strategic project to leverage large amounts of change linked to food resilience, giving communities access to perennial edible food sources (Bailey, 2018) that, once planted, either by private individuals or by community-initiated projects, would produce food for decades or centuries depending on the type of food planted, taking pressure off rural lands. This food had the added advantage of being carbon-**

negative after a few years of production to sequester the delivery footprint. Growing Value continues to be leveraged by helping gardeners, farmers, landscapers, community organizations, and even other nurseries learn the proper cultivars and perennial food sources ideal in this region. After fourteen years, tens of thousands of food-producing plants have been sold and planted across the region, addressing food insecurity and increasing access to fresh food for all community members as we move towards a sustainable future. This nursery builds on the permaculture concept that if we have resilience in the most critical aspects of our survival, specifically food and housing then we can break free from the drive to sell another low quality durable good. Through mitigating our exposure to the brittle aspects of our economy, we can design longer lasting products, bringing this journey full circle. This paper highlights how the practice of Permaculture Design has powerful design principles to answer complex sustainability challenges in tackling Industrial culture's brittleness, specifically around food access (Hemenway, The Permaculture City: Regenerative Design for Urban, Suburban, and Town Resilience, 2015).

KEYWORDS | Permaculture Design, Mutualistic Design, Food Resilience, Product Longevity, Regenerative Agriculture

1. Introduction

Twenty-five years ago, starting a journey into sustainable product design to address product obsolescence, the answers to complex sustainability challenges were difficult to come by. Early introductions to working with the homeless while also being introduced to home ownership in the US through mortgages made me very aware of the gerbil wheel we had created. These experiences coincided with my early introduction to Industrial Design and its issues with planned obsolescence. All of this made me keenly aware of the ruthless drive for employment to avoid the threat of homelessness and starvation. We had designed an ecologically destructive brittle society (Diamond, 2011). Around this time, I was also introduced to Earthship homes and their owners who lived debt free with a very low cost of living through building their own Earthships. Earthships are fully off-grid homes made of repurposed tires, cans, and bottles combined with other natural and a few industrially produced materials to create passive solar homes. They capture and store the sun's heat and coolth of the earth through passive solar design, eliminating fossil fuel use. They also incorporate rain water harvesting for their water sources, however as waste equals food, it's recycled to grow plants off the cascading waste water cycles of the house 4x to produce food and to filter the water. Lastly, they employ small solar systems for western comforts such refrigeration, lights and electronic media like computers and televisions. This concept made me realize that one of the best ways to transition a society from destroying itself through ecological failures was through empowering individuals through deep green living. Around the same time, I was introduced to permaculture design. Earthships nested within permaculture's holistic philosophy as they employed many of the same Principles of Permaculture, which are simply a reflection of cooperative ecological principles.

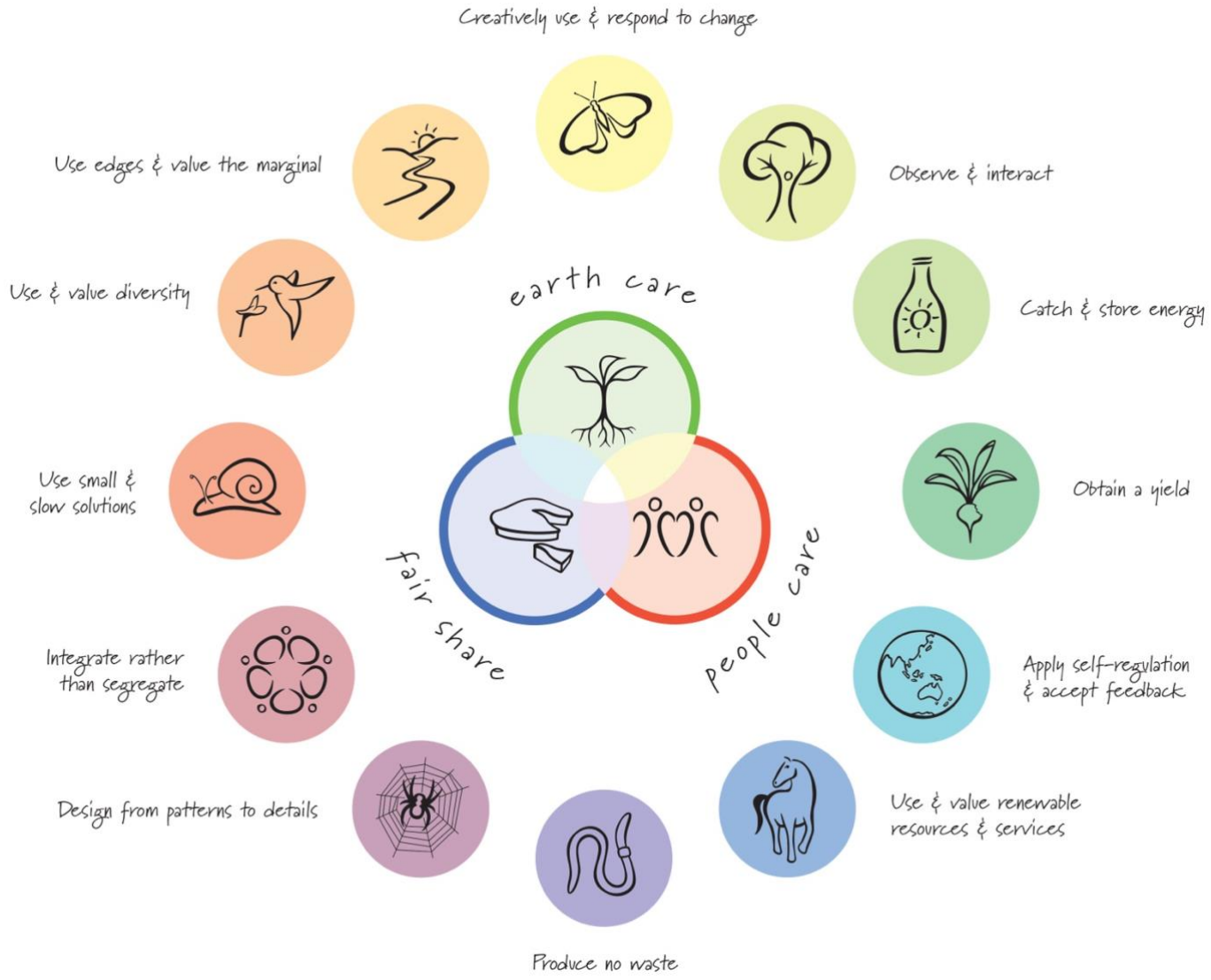

Figure 1: Holmgren's Permaculture Principles and Ethics (Holmgren, 2002).

However, Permaculture expanded Earthships drive for ecological independence through its design principles and methods to create low work, high yielding landscapes surrounding the home. This was achieved through radiating the home user's management capacities out, via interaction frequency, into the yard and any surrounding farm land but also communities, and even nature, to support humanities needs of food, fiber, fuel, fodder, pharmaceuticals, and fertilizers (Jacke, 2005). This was all while supporting native flora and fauna's needs, all to help us break free of unsustainable industrialized methods. Its ideal aim was to be as ecologically independent from Industrial societies' destructive ways through working with nature and enhancing it. After attaining my Permaculture Design Certification (PDC) by its founders I began to train others in my hometown. This was received well, and after 2 years and 60 graduates of our PDC it became clear that a Nursery was needed. A Nursery was a key leverage point that could create the 'greatest change for least effort' (a Mollison permaculture principle that's reflected in its foundations of 'eco'-systems design) that was low cost and attainable to move society towards this vision of ecological integration. There are many other ways to implement this permaculture vision, such as how the Earthships are doing it, or accessible green energy, or bike lanes, but they are much more technical, complicated, and expensive, especially in a city, compared to a simple nursery. A permaculture-based nursery was a gap in local sustainable resources in our community's green ecosystem. This was underscored as the nursery grew into a

community staple in a handful of years, helping people to build out low work, high yielding food sources throughout our community. Overtime, it became clear that this was a complimentary strategy to other permaculture aligned strategies to address product longevity through individual and community resilience. If all the people who touched that product's journey to market had this type of ecologically designed resilience into their lives, then that goal could be achieved (Macchindra, 2024). Now it may not address the hyper resource needs of our largest urban cities, but it could address the needs of our midsized cities or ones designed around the automobile, as David Holmgren points out in his book ***Retro-Suburbia: The Downshifters Guide to a Resilient Future***. This paper explores the build out of that nursery and its impact on resilient urban life in a city of 1 million. This is one strategy of Permaculture and case study of Mutualistic Design which can ideally slow non-renewable resource use in product design.

1. What is Permaculture?

To begin, Permaculture is an ethical ecological design philosophy that could be summed up as Human Centered Design meets homesteading or ecological living (Hemenway, The Permaculture City: Regenerative Design for Urban, Suburban, and Town Resilience, 2015). Permaculture is founded in ecological energy theory and the work of Howard T. Odum, who pioneered the quantification of the ecological footprints of our fossil fueled society (which is simply fossilized carbohydrates) to help us get a grasp of the challenge, one of non-renewable energy (Odum, 1996). It offers design solutions to build a society beyond finite resources through designing with nature. It is founded in Ethics – Earth Care, People Care & Return the surplus to the first two ethics. Followed by numerous Principles created by its founders and added to by countless practicing permaculturists, all to understand and reflect the cooperative principles of nature. Third is the design process, which concisely consists of zoning (human energy radiating out from the home with 5 defined zones, 1 being daily interaction, 2 weekly, 3 monthly, 4 biannually and 5 - the wild ecosystem), combined with sectors (natural energies flowing into a property that can be mitigated or captured, such as sunlight, water or wildlife) and guided by the niche analysis for each element placed on a site (identifying the needs/inputs, yields/outputs and intrinsic characteristics of each element placed in a site, be it a fruit tree, fertilizing plant, livestock, greenhouse, garden or solar panels) to ideally fulfill the users and every elements needs on site through fulfilling ones needs with the yield of another element on site. This creates the development of a self-sustaining habitat for humans through good design processes. In 2006 David shared with me that they produced 60% of their food, 80% of the economic value (implying that staple crops were supplemented) on their 2.2 acre permaculture homestead in Hepburn Springs, Victoria, Australia. David documented much of their first 10 years of implementing permaculture at this site with his family through his 1995 publication, ***"Melliodora" Hepburn Permaculture Gardens: 10 years of Sustainable Living***, proving that this was possible. I will add that while I was there for 10 days, they had plenty of free time throughout the day, despite producing a majority of their food, reiterating its potential.

2. A Short History of Permaculture

To begin, understanding the history of permaculture is to understand the limitations of a society powered by non-renewable energies, for it was developed shortly after the US hit Peak Oil in 1973 and the ensuing malaise in the subsequent years. It was David Holmgren's senior capstone, whom he worked with his Professor, Bill Mollison on. They went on to publish a book together, ***Permaculture 1*** in 1978. David told me in 2006 that he

envisioned agriculture synthesized with ecology through design thinking. This was reiterated in ***Permaculture One***, on page one paragraph 2:

> "Perhaps we seek the Garden of Eden, and why not? We believe that a low energy, high-yielding agriculture is a possible aim for the whole world, and that it only needs human energy and intellect to achieve this." (Mollison B. &., 1978).

David said that he went on to live it, as he wanted to prove that it could work, hence why he didn't have another major contribution to the field through publications for another 17 years. Yet, Bill went on and published ***Permaculture Two*** a year later, expanding on these initial ideas. He acknowledges 'fruitful' conversations with several people including, Keyline Design inventor, P. A. Yeoman and Industrial Designer and author of ***Design for the Real World***, Viktor Papinek in his second publication (Mollison B. , Permaculture Two: Practical Design for Town and Country in Permanent Agriculture, 1979). In later publications, they went on to expand these ideas to sustainable building, living and society, while also validating their ideas through a global network of trained practitioners (Mollison B. , Permaculture: A Designer's Manual, 1988). It really expanded globally through the PDC in conjunction with books and the internet.

It initially gained a lot of momentum in the 1970's during an era of hyperinflation as food grown at home has minimal impact from inflation, which was not exclusive to permaculture. The Ford Administration created the Whip Inflation Now or WIN campaign with one of the most successful New York Ad agencies, which it promoted through advertisements that this $10 gardening set could save you $290 by growing your own vegetables (Rocca, 2023). Permaculture took these ideas to end inflation and built on the '70's back to the land movement and filtered it through these design influences. This shifts the idea of the consumptive lifestyle towards an ecologically productive lifestyle. This is critical in a post-Industrial boom built on finite resources as Industrialization and its outgrowths such as planned obsolescence are only viable if resources are cheap and abundant. It also begins to rebalance the transition from 90% of Americans being employed as farmers in 1790 to less than 1% still being employed in the field – resulting in a brittle Industrialized culture (Trauth, 2016). It is this dance between brittle industrialized progress and designed resilient sustainable living that permaculture offers to address the formers shortcomings. Ultimately offering a designed path to deindustrialize into a comfortable sustainable lifestyle anywhere in the world but leaving it to the individual and their communities to find that balance.

3.Creating a Permaculture based Nursery

After successfully training a small community through our initial course, supported by 4 fellow trained Permaculturists, this edible landscaping nursery was the best next step to build out the budding community. This nursery was, simply put, built on the ecological principles of a forest, yet with a higher useful yield. This idea is a large topic, and one teacher, now colleague that I reference, Dave Jacke has written a 2 volume, 900-page series on the design of this one topic of permaculture, focusing only on temperate climates. However, he lays out a vision of food production, modeled after forests that, once understood, can translate into several other low work food production models, such as forage gardens, edible landscaping, and regenerative agriculture (Bailey, 2018). There are more condensed books on the topic too, but none built on such extensive ecological research and design processes (Weisman, 2014). One permaculture principle, "We are Nature Working", coined by Permaculture teacher, Penny Livingston Stark, broke me of my

deep ecology training of protect nature as a pristine museum over there and live green in society over here, was critical. This nursery was built off this idea.

Perennials are used because nature primarily relies on perennials (plants that live multiple years) over ruderal annuals that require work each year to make them productive, which modern society is built upon (Hemenway, Gaia's Garden: A Guide to Homescale Permaculture, 2009). Ruderal annual plants are rare in nature, waiting for disturbance to occur, such as a tree falling, so they can quickly capitalize on the available sunlight to reproduce (Jacke, 2005). Annuals are rare in climates with available water and temperatures to generate a forest and thus one of the many reasons to mimic a forest for these designs besides its reduction in work. Our dependence on annualized farming is how civilizations destroyed their soil. This has always been the foundation of civilizations energy sources (both food and otherwise), and thus as tillage each year destroyed their soils slowly over an average 500 years, they ultimately contracted and unraveled (Montgomery, 2007).

If a community is located in a lower producing ecosystem, such as a prairie or desert, (these large settled communities are only possible in a fossil fueled world) then they need to aggregate and concentrate rain and surface water through Keyline design processes to alter the landscape in order to increase its productivity (Shephard, 2020) (Lancaster, 2019). However, even in a rainy climate these Keyline design processes, such as swales, can help low managed food forests survive an extended drought, especially during establishment. Once they are established though, they should operate as closely to a forest as possible, minimizing work and increasing yield.

Food Forests are different than orchards, especially industrial orchards, in that orchards are traditionally designed to minimize nature's impacts through sterilization and then replacing those support networks with industrial inputs, just like industrial annual agriculture. Dissecting a forest and its complex relationships, through ecological science is the foundation of designing a food forest or forage garden. The ethics, principles and design methods that Permaculture employs are reflective of nature's resilient, regenerative and mutualistic aspects that have kept it productive through thick and thin for millions of years. Understanding these processes is critical to build sustainable food and resource development and ultimately economy, which is simply mimicking the system we evolved out of. To think we can develop a better system than from where we came on a limited planet is to our own peril as exemplified throughout history (Diamond, 2011).

4. What design goals do we need for a Permaculture Nursery?

4.1 Plant Architecture & Function to Create Guilds

Jacke's design process is extremely thorough, given the complexities of nature, so we kept it simple for the sake of assisting people to replicate these models, pulling from his trainings and other permaculture sources. Starting with assigning each food forest plant into their architecture and function allowed us to identify what plants we needed to carry. Architecture he bases off the plants mature size, which he breaks into 7 categories:

1. tall tree
2. small tree
3. shrub
4. herb

5. ground cover
6. vine
7. roots.

Some of these layers, such as root and vine can cross over into other layers as its difficult to fit all plants into clean categories, given that evolution is a complex process. For function, he breaks plants into one or more of 5 categories:

1. producers
2. fertilizers
3. habitat for beneficial insects
4. aromatic pest confusers
5. food for pollinators.

Most plants will fit into at least two categories of function, as plants serve many purposes within nature, unlike our monocrop agriculture methods, where we only see and employ them for one yield. This allows the designer to check boxes as they seek to mimic the many roles' plants fulfill in nature to build its resilience and self-renewing productivity. These multiple yields, if designed right, can increase the productivity of each plant, minimizing work for the user. An example might be the placement of a Paw Paw tree and a Box Elder. A Paw Paw tree will produce food for humans and wildlife alike. However, if both are placed in the right location for Time Stacking, the fast-growing Box Elder can provide shade for the young shade loving Paw Paw, relieving sun stress on it, helping it get established. Once the Paw Paw is established the Box Elder can be harvested for timber or fuel wood. Both can provide the yield of shade for a house or shade loving plant on a hot summer day (eliminating the need for energy to cool the building or installing awnings) while their leaf drop in the fall allows the sun to warm the house in the winter. Other yields could be fuel wood, structural wood, medicine, syrup, soil building through its leaves and soil stabilization through its roots, just to name a few. Mollison states that:

> "The only limit on the number of uses of a resource possible within a system, is the limit of the information and the imagination of the designer" (Bill Mollison, 2011)

There are many other design processes that Mollison lays out to mimic those natural systems, but we'll keep it focused on that of the Nursery. Proper placement though, is critical to capture those yields, especially when designing a guild of plants. Jacke defines a guild as *"groups of species that partition resources or create networks of mutual support."* This is the foundation of a food forest on the smallest scale. Each plant is sharing resources through thoughtful design in space and time rather than competing for scarce resources they both need in a given time or space through mindless design. This is a form of Designed Mutualism.

Figure 2: Edible landscaping in Cincinnati modeled after food forest principles.

4.2 Ecosystem Succession

Succession is the process of a field going from bare soil to mature forest over decades. In the Tropics, this process is much quicker than Temperate climates. Jacke explores the ideal horizon that we should aim for in our successional designs quite thoroughly in his book, exploring many different possibilities. Dave identifies that an Oldfield, a temperate climate field that hasn't been mowed in 20 or so years as an ideal model because productivity is at its highest before taller trees begin to shade smaller trees and reducing productivity. Fortunately, as he points out, most of our perennial foods are evolved for this level of succession, including most of our fruit trees like apples, pears, and peaches to name a few. However, we've found that there are cases where sites may afford limited management and thus aiming for a more mature food forest horizon, one that mimics a mature forest is more appropriate. Thus, we also carry taller trees as well, although they

turned out to be much slower sellers due to their time and size commitment for producing useful food or yields, especially in tight urban sites.

4.3 Designing with Succession and Function

By working with natural successional processes of an ecosystem, reflecting one permaculture principle from the west coast of the US, “Work with, not Against”, a lot of work is eliminated. In contrast, disturbing ecosystems through tilling to create annual farms and gardens and thus eliminating competition, most often called ‘weeds’ results in a lot of extra work. Some of this work is bringing in artificial support such as pesticides and fertilizers now that the support networks are eliminated. This reflects the principle of “the intervenor becomes the manager” and thus must rebuild all those connections artificially. A forest thrives without any of those artificial inputs. To mimic that process when designing a food forest, instead of pesticides, plants are selected to provide habitat for predatory insects such as spiders. Fertilizing plants are chosen to replace fertilizer produced by finite natural gas and minerals that are mined. Appropriately bred cultivars of food producing plants that have disease resistance ingrained in their genetics are used instead of common, marketable cultivars for industrial distribution. This all builds and mimics the resilience found in a forest, a well-designed and evolved system through trial and error and collaboration with wildlife and in some places, humans, which eliminates work for the manager through good design.

4.4 Plant Propagation and Breeding

The last piece to learn about plants was breeding, a large topic. Although, since we were buying these plants wholesale for the nursery, this wasn’t as much of a concern. Our primary research came down to identifying and selecting desirable, disease and pest resistant varieties, which we learned about this from land grant universities, extension agencies, wholesaler websites and local experience. This basic knowledge is what we built the nursery out of, each year delving into more and more diverse types of plants to add to our design palette as we learned about each cultivar or varieties of plants that worked in our region to produce low work food.

Figure 2: Jujubes (Ziziphus jujuba) growing in an edible landscape in our region.

4.5 The Benefits and Challenges of Native Foods

Wild, native foods are even better, given their adaptations to the local climate. In the eastern US the First Americans cultivated these perennial, now wild foods, which has only been understood in the last few decades with new archeological understandings of the Americas (Mann, 2011). However, there is not much research on the topic, but much evidence that remains with the diverse native food sources in the Eastern US Forests. Some of those foods include American Chestnuts (almost eliminated from disease that was introduced through global trade), Hickories, Acorns, Walnuts, Hazelnuts, Paw Paws and Spicebush to name a few. Fortunately, these food sources are wild and require no cultivation or inputs to 'Obtain a Yield', another permaculture principle from David Holmgren. To employ these foods though, it requires a shift in western palettes as some may not be that tasty to our sugar and fat adapted palettes while others may be high in tannins which may require alternative processing, such as acorns or persimmons.

Figure 3: Paw Paw Fruit (Asimina triloba) are a flavorful native fruit that grow wild in our forests.

4.6 Chemicals, Soil Microbiology loss and Restoration

Industrial cultivars are typically selected for their appearance, flavor, productivity, and shelf stability, over their disease or pest resistance since fungicides and pesticides are sprayed throughout. These chemicals sprayed on these fields are deadly to the natural microbiology that evolved to support all plants nutrient needs but especially our traditional food producing plants. When they are eliminated, then we must do the work to provide it for them (Jacke, 2005). The energy intensive system of industrial agriculture is a net negative in terms of energy in and energy out and is only feasible for a short time while fossil fuels are cheap due to their energy footprint (Trauth, 2016). Industrial farming undermines the soils and the soil microbiology they are grown on, which has been a vexing problem since the earliest forms of this type of agriculture (Montgomery, 2007). Fungi, which most of our plants depend on in the soils, die off quickly once tilled as it destroys the hyphae network they develop. This wipes out a major ally in the development of nutrients in the soil for plants, which most food producing plants rely on, based on a discussion with Dr. Elaine Ingham years ago. Soils transition from bacterially dominated in deserts to fungally dominated in forests and a balance of the two in between (Jacke, 2005). If a site is being restored, then it is recommended to introduce micro-organisms through aerated compost tea inoculated with a handful of soil from a local healthy forest. This introduces these microorganisms back to the site to initiate the healing processes to establish these low work high yielding food systems.

5. Establishing a 501c-3 Nursery

Our goal was to get low-cost perennial edibles to everyone in the community, especially, those in need. So once Cincinnati Permaculture Institute attained non-profit status through the IRS, we established the nursery under its umbrella. This empowered us to purchase plants with tax exempt status, reducing costs. It also allowed us to access grant funding, which helped to keep our prices artificially low. These prices rivaled the cheapest big box hardware nurseries, yet with more appropriate local cultivars. We were required to charge sales tax though to customers unless we kept sales below 6 events a year, per state regulation. We wanted to increase access, so we are open many days a week for most of the year. This 501c-3 status requires a bit more work than a private for-profit business, but the mission has a leveraging effect over most food access non-profits. This is possible in that for the price of a couple quarts of organic berries, one can plant one berry plant that will produce endless quarts of berries for a lifetime. It can produce dozens of quarts of certain berries within one season. This is true for fruit and nut trees as well, multiplying our non-profit dollars, while reconnecting our community with the land once again, which can have many other benefits as well.

Once the nursery was established, we used our design background to brand it and market it to the public, which has slowly grown over those 14 years. Starting with a small $5000 inventory, we soon grew to $50,000 inventory in 7 years through investing sales and through donations from local foundations that believed in our mission. These foundations believed in our mission because one model we worked on developing was addressing fresh food access through forage gardens for communities plagued with food deserts. The nursery now carries 195 named cultivars of perennial edible bushes, trees and herbs to help students' mimic nature's design of the local ecosystem while producing valuable resources, most specifically food though. This empowered students to plant low work food in their own yards and around the city, building food resilience.

6. Community Expansion

As we trained more and more students each year, different opportunities and ideas came to the forefront and gained acceptance by the public and its leaders. Our first collective public demonstration was headed up by a permaculture teaching colleague who also worked with a local organization that managed 40 community gardens. The city had designated a half-acre parcel in the middle of 3 major roads and a bridge, that was a remnant of urban renewal, as part of its 9 plots for urban agriculture. Unfortunately, it had access issues for farming, such as curb cuts for trucks and access to consistent water. This site was perfect for a forest garden though. So, in 2011, my colleague enlisted the help of our local Permaculture Group for volunteer help to plant it out. This forage garden would be an ideal solution to such a parcel of land. It incorporated swales, or ditches on contour, for passive water harvesting, a common permaculture tool, in conjunction with several different species of perennial foods and support plants, most of which were native wildflowers. This helped it get established despite challenging site factors such as urban heat island effects. After a couple years, those resilience strategies paid off and it was producing large amounts of food for little work, with each tree or bush producing bushels, or tens or hundreds of pounds of fruit, nuts or berries depending on cultivar. This was for little work which included primarily grass cutting and weeding in and around the food forest beds.

Figure 4: A swale holding water in winter for irrigation with caged nut and fruit trees below it at our first public forage garden experiment.

For management, this garden has changed hands several times over the years, mostly through various non-profits as they had the funding and capacity. However, the real anchor has always been a neighborhood steward who lived nearby. They always organized and facilitated volunteer days with those non-profits, maintaining consistency over the years. One element that helped boost the effectiveness of it was integration of signage as well as a brochure (half of it is pictured below) to inform people strolling through what and when to harvest. Most people who do access the site are through the bus stop next to it. This is either through transferring between bus lines or walking between a Walmart 300 meters away and the bus line. It is not an ideal location for access because of the roads surrounding it and residences being at least 100 meters or more away. Yet, it does have that access to those bus lines, which are primarily used by a lower income demographic and thus less access to fresh food due to finances. It also gives us an opportunity to experiment with what works and what doesn't work in terms of plants on free land in the city. Overall, it has been a good learning experience for refining this model.

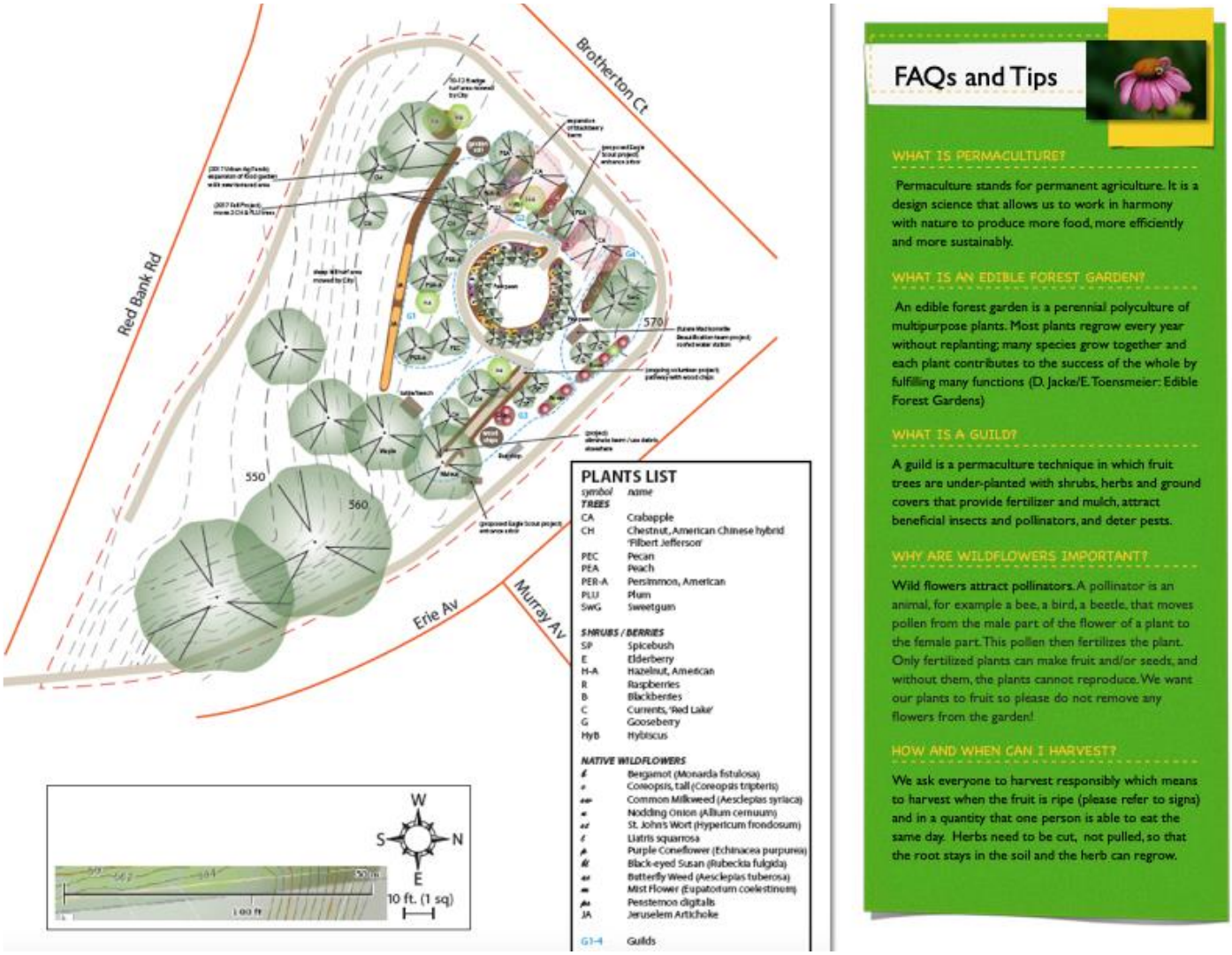

Figure 5: A map from the Forest Garden Brochure laying out where each plant is, along with information about Permaculture gardens

This model was then replicated in 6 different formats around the city. One is a food forest with a longer climax horizon, moving towards a tall food forest of nuts after the smaller and shorter-lived fruit trees have died off. Another is more of an orchard, while one is more like edible landscaping for community beautification. The one commonality amongst these is that they are all in low-income neighborhoods, with less access to resources for beautification or even grocery stores with fresh food. These are all prototypes to increase access to fresh foods, as the poverty diet in America is heavily dependent on low-cost foods that have long shelf lives. This diet is known to have major health impacts and thus underscoring the importance of designing strategies to increase low-cost fresh food access.

These ideas have now been adopted by a new non-profit, Common Orchard Project, who specializes in this topic exclusively, set up by a former permaculture student and teacher of ours. He only focuses on installing low work perennial food gardens around the city.

It has also continued to grow through private endeavors as well. Several students have stepped up to start permaculture based edible landscaping companies. This opened opportunities for students to integrate permaculture landscaping concepts into clients' yards, making it accessible to more of a middle- and high-income crowd.

The last endeavor to expand the impact of the nursery and these concepts has been the

development of Community Food Maps by a colleague. This colleague took it upon himself to document publicly available perennial food throughout different neighborhoods in our city. These have been posted throughout different non-profit locations in each neighborhood as well as online. These approaches are all different ways to build resilience, fresh food access and ultimately mutualistic lives that can slow down and align with the natural productivity of nature and the earth.

These ideas are not exclusive to our community and are being recognized for their potential to address food and resource needs while also increasing ecological activity in our human landscapes. Overtime, these ideas hold a lot of potential to help us transition our cities into higher sustainable productivity (Macedo, 2013). However, having a nursery exploring local perennial food sources accelerates the success of these ideas.

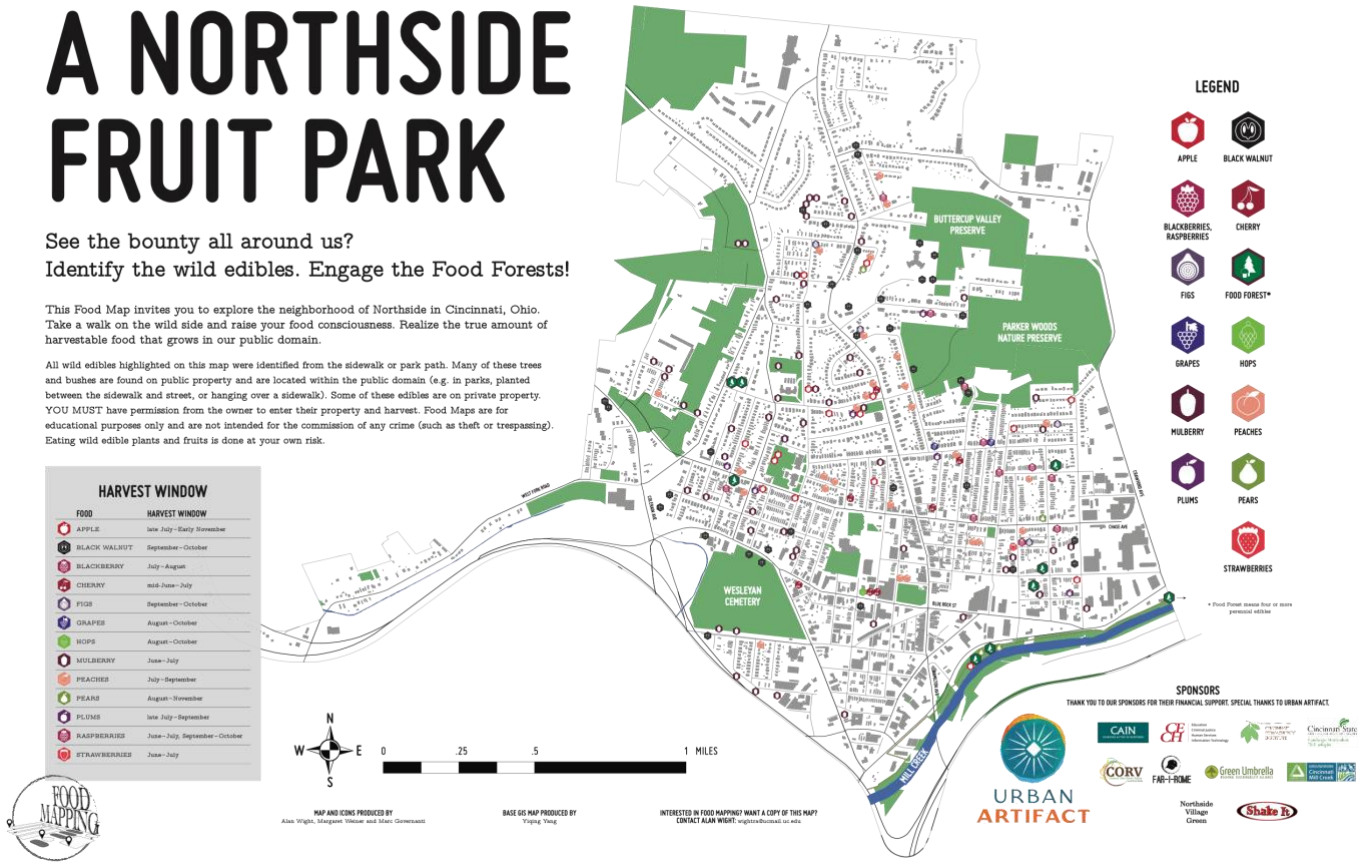

Figure 6: A Neighborhood Perennial Food Map which includes an early public food forest we installed (Wight, 2024)

7. Influencing Product Design and slowing business cycles and consumption through resilient community design

Over time, some of our permaculture students were also industrial design students who, collaborating with one of their permaculture classmates on an idea he had, went on to launch a sustainable product company. However, as they scaled up it became clear that they would become victim of the never-ending struggle for income from product sales unless they embodied the full permaculture ethic, that of designed ecological resilience in their lives. It also underscored that appropriate technology, which their idea was built upon and is a key piece of Permaculture design philosophy, could be applied to

traditional Industrial design. However, if the company integrated permaculture into its employees lives it could liberate or at least reduce the economic brittleness of everyone involved in the products journey to market. Applying the permaculture philosophy liberates humans from the linearly extractive economy. This resolves those deep questions around product obsolescence, a philosophy that was derived out of the Great Depression, an experience that underscored the brittleness of Industrial capitalism (Dannoritzer, 2010). However, to build out the resilience that permaculture aims for requires strategic thinking in how to leverage these ideas into a community. One of the easiest to attain this resilience on a community wide affordable scale was an edible landscape nursery. Working with this start up industrial design company highlighted that there needed to be more guidance, which inspired the next step in building out this vision.

8. Mutualistic Design expansion program

This all led to my Master's Thesis, Symbiotic Design, but renamed to Mutualistic Design; product design through the lens of Permaculture's principles, vision and ecological energy theory (Odum, 1996) to synthesize all these ideas. It is founded in the concept that Humanity is the Planetary Keystone species, destroying or creating ecosystems (Mann, 2011). However, this needed to be accessible and key players in the community needed help to lead and facilitate this change within their employees lives but also into the broader community. Out of this recognition we developed principles and directives, like what Permaculture employs, but more directed at urban communities and wrapped up into what we called Mutualistic Society (Cincinnati Permaculture Institute, 2025). This has been slower to build out as funding and time has been scarce. Nonetheless, it lays out a vision to help accelerate the uptake of these ideas and ultimately build out a Mutualistic Society. Below is the vision and bullet points to build it out.

> We aim to build resilience, independence & mutualism for our city's residents and our bioregional ecosystem through:
>
> - Housing & Buildings:
> - Debt Free Housing
> - Net Positive Water & Energy
> - Food Production
> - Passive food production on low maintained land (relying on perennials)
> - Active food production in high maintained areas (relying on high turnover and high production annuals)
> - Planting of native edibles in urban zone 5
> - Comprehensive Passive water management
> - Passive water harvesting designed into appropriate public & private (not too steep) lands and structures (relying on keyline design strategies to recharge the hydrological cycle and build water resilience)
> - Business
> - Transitioning mature, thriving businesses into worker owned businesses.
> - Collaborating with B Corporations, Permaganic Authenticated
> - Social Justice
> - Access to these concepts to those in need
> - Implementing appropriate accessible technologies to achieve these goals.
> - Developing & supporting cultural events that help integrate & grow the fulfillment of these goals.

This program also includes a graphic, laying out the possibility of this vision. It recognizes the limitations of urban resource production and the increasing potential of resource production as homesites grow as they radiate out from the urban core. Depending on the age of the city, urban cores that were pre-automobile were very dense, yet as the automobile was integrated, yard sizes increased. Our rustbelt city reflects these eras of development, and this graphic reflects that. Based on regional experience, this graphic identifies those yards and farms with 1-5 acres or more have the potential of self-sufficiency and to start supplying the urban core with resource needs. The Nursery aims to support this vison. This is the way cities and towns were always laid out, pre-industrialization. However, finite fossil fuel empowered globalization of foundational resources, including food, and why we must rebuild it.

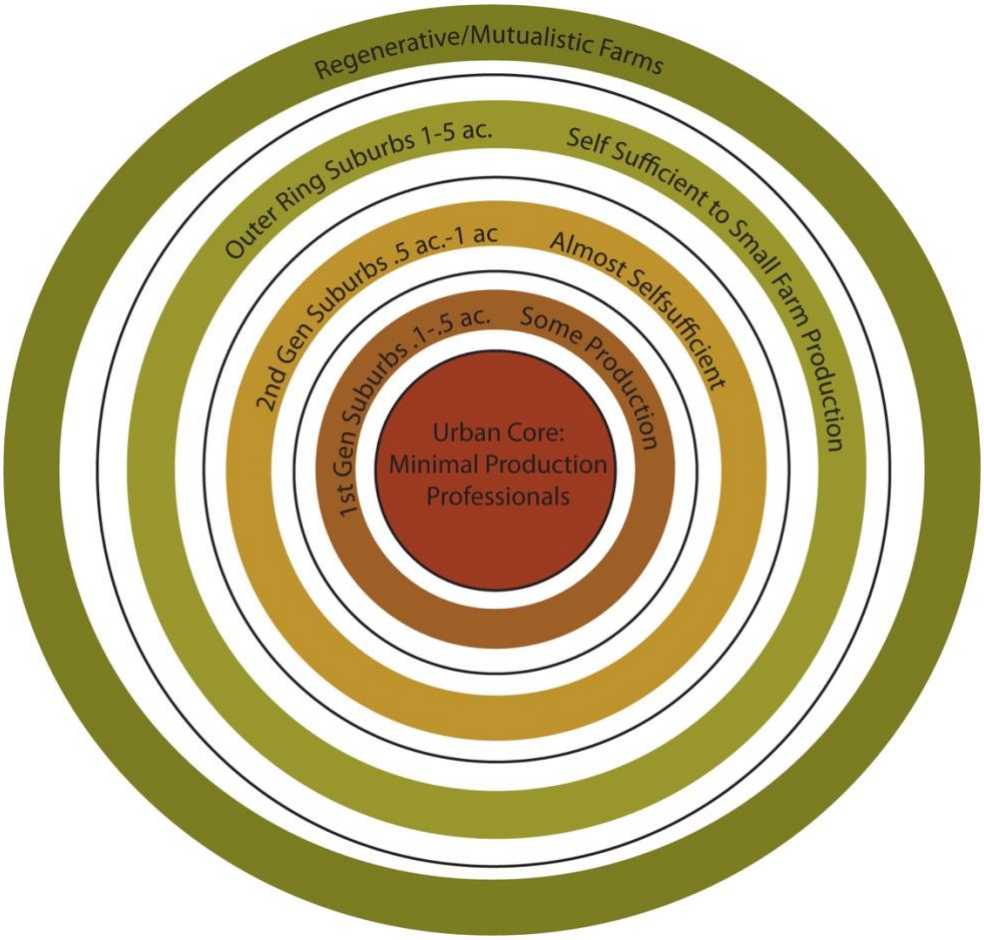

Figure 7: A Mutualistic Design plan for implementing permaculture across urban landscapes (Cincinnati Permaculture Institute, 2025)

9.Conclusion

The roots of planned and perceived obsolescence are rarely identified and talked about due to the complexity of the world we have designed and built in the industrial era. However, answers to these challenges are found through ideas like permaculture and Mutualistic Design. Implementing these solutions have taken years to implement, first to train locals in these ideas, followed by the development of the nursery and then concluding with trials of these various perennial low work urban food production methods. These plantings were experiments that were successful in reclaiming local food

sovereignty after decades of centralized food production through industrialization. These local case studies highlighted that large amounts of fresh food can be functionally produced through these low work processes. Not only were these plants designed and planted in guilds to mimic natural systems in people's yards but also on public and private lands throughout the community. Bill Mollison's quote "The Problems of the World are Increasingly complex, but the solutions are embarrassingly simple" underscores that we can all find our way out of these complex challenges. Fossil Fuel has provided us with incomprehensible opportunities. However, moving beyond its finite, polluting and extremely energy dense realties are an enormous challenge. Fortunately, Permaculture and Mutualistic Design movements give direction on how to design our way out of these complex challenges. We must design products that leverage our capacity to do work, as they've always done, but that also reflect the limitations of finite resources in conjunction with the infinite opportunities of renewable resources of earth.

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ethical leadership
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L'ÉCOLE DE DESIGN Nantes Atlantique

AN INTERDISCIPLINARY APPROACH TO RESEARCH THROUGH DESIGN AND CONSUMER BEHAVIOR: COMPLEMENTARITIES AND METHODOLOGICAL PROJECTION. APPLICATION TO THE STUDY OF LOCAL CULTURES ROLE IN REDUCING MEAT CONSUMPTION.

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ABSTRACT | This article aims to find connections between the two disciplines of design and study of consumer behavior to conduct a doctoral research exploring the role of culture into dietary changes. Reducing meat consumption is one of the major challenges in the transition to a more sustainable food system. In many countries, especially in France, reducing meat consumption faces numerous obstacles. However, this issue extends beyond questions of production and depends on broader systemic factors, particularly consumer behavior, lifestyles, and practices. Indeed, food choices are not rational decisions and are influenced by economic, social, geographic, and cultural factors. The symbolic dimension of food, driven by the eater's food culture, plays a decisive role. The combination of design and management sciences, including consumer behavior, appears to provide a relevant framework for exploring this hypothesis. These two disciplines are complementary and converge both theoretically and practically, as well as the question of their purpose: arising from a consumer society, each hosts movements aimed at improving the "habitability of the world". Theoretical perspectives will emphasize the common characteristics of these two fields regarding their history and purpose, the central position given to the user and the definition of their needs, as well as the major importance of semiotics and representations. On a practical point of view, we will explore the potential contributions of design, particularly as a method of observation and data production. We will examine the designer's sensitive perspective on everyday practices (from

product choice to recipe execution, from the use of utensils to table setting practices and eating manners. Using a research-project approach, we will expose our projected. Finally, we will discuss how design enables innovative research and the production of scientific knowledge in management sciences, as well as in academic research more generally, and how it can offer potential solutions to the current challenges related to food serenity.

KEYWORDS | design research, consumer behavior, marketing research, methodology, interdisciplinarity, project-based research, food design

Introduction

The development of a research project in design raises the question of disciplinary positioning. The interdisciplinarity claimed by designers (Findeli, 2015) can indeed create challenges in defining an epistemological framework. We explore these questions through our doctoral research, which draws on two disciplines: design on one hand, and management and business sciences, specifically marketing and, more precisely, the study of consumer behavior. We attempt to combine these two disciplines in the service of a research project that views local food cultures as levers for the greening of diets. Initially, we will aim to identify the connections between design and research in marketing and consumer behavior. Subsequently, we will attempt to make a broader contribution to the reflection on the contribution of design to academic research by presenting our projected methodology.

1. The combination of design and management sciences

In France, all doctoral work must be registered under a section of the National Council of Universities (CNU). Since design is not a standalone section in the CNU classification, design research is always associated with another discipline. Thus, the doctoral designer typically registers in a discipline closely related to their research topic (historically, design research has mostly been classified under section 18, Architecture, Applied Arts, but it is now expanding into a wide range of disciplines) (Le Boeuf, 2021). This specificity requires a dialogue between design and the discipline in which the doctoral research is registered, in terms of epistemology, theory, and methodology, requiring prior acculturation of the doctoral student with their host discipline (Rapin, Artignan et Fournier, 2024).

1.1 Original definitions and misuse of terms

Marketing and design complement each other, and can be compared on both theoretical and practical, epistemological and methodological levels. Bringing together theory and practice, they take on reflective dimensions and their application through projects. Design and marketing are also two notions commonly misused as qualifying adjectives (Derbaix, 2022). Their definition differs widely depending on whether they are used by the general public or by their practitioners. According to the American Marketing Association, the term *marketing* refers to : "*an activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that create value for consumers, customers, partners, and society at large*" [1]; its common usage describes

[1] Définition of marketing according to the American Marketing Association, 2013, https://www.ama.org/the-definition-of-marketing-what-is-marketing/

manipulative sales practices and the creation of artificial needs (Derbaix, 2022 ; Le Nagard et Giannelloni, 2016). As for the word *design*, in everyday language it characterizes a refined, minimalist style of decoration. Often simplified in a reductive way, these two disciplines can nevertheless enable tangible solutions to contemporary environmental and social issues to emerge. At this point, a brief definition of these two disciplines seems necessary.

Consumer behavior is a field of marketing that studies all the behaviors adopted by individuals to seek out, buy, use and dispose of the products and services with which they wish to satisfy their needs (Schiffman, Kanuk et Wisenblit, 2010) . Here, the consumer is considered in his or her : "*multiple facets and roles*" and "*subject to diverse and constantly evolving influencing factors*" (Clauzel *et al.*, 2016). Studying the role of internal influences (demographic factors, needs, values, motivations and disincentives, attitudes, beliefs and emotions, etc.) and external influences (culture, social factors, situational factors, etc.) on behavior, this field of research borrows numerous concepts and methods from the disciplines of economics, sociology, psychology and anthropology. It is particularly relevant to the field of food consumption and behavior, with food products : "*at the heart of the development of the marketing discipline*" (Aurier et Sirieix, 2016).

Design, as a practice, is defined by the Alliance française des designers as an intellectual, creative process, the aim of which is to provide solutions to problems of use linked to economic, social and environmental issues[2]. Applied to the context of food, this process is known as food design. This design specialty is characterized by its strong systemic dimension, articulated around four major pillars: food, environment, society and technology (Zampollo, 2017). Design research, for its part, is, according to Stéphane Vial : "*the attempt to make design a scientific discipline*", resulting in the creation of knowledge about the design process itself, but also all areas of : "*human ecology*"(Findeli, 2010 ; Vial, 2015)

1.2 Questioning the purpose of these disciplines considering current social and environmental issues

Design and marketing share questions about their purpose: the fruit of the development of the consumer society, they are now home to trends aimed at transforming society to respond to the urgency of ecological and social transitions. For many years, the search for innovation and the creation of new offerings, the main fuel for these two disciplines, had the sole aim of selling an ever-increasing number of products (Dekhili, Merle et Ochs, 2021). In the 1970s, designers and marketers[3] began to question the meaning and purpose of their disciplines. Victor Papanek's publication "*Design for the real world*" (1971), calling on designers to rethink their mission and aim to improve the : "*habitability of the world*", helped transform practices. The more recent development of care design and public-interest design are good examples of the discipline's renewal. At the same time, the "*Marketing's Changing Social/Environmental Role*" issue of the Journal of Marketing (Kelley, 1971) opened up the question of marketing's relevance in areas of : "*real life - such*

[2] Définition of design according to l'alliance française des designers : https://www.alliance-francaise-des-designers.org/definition-du-design/

[3] In the interest of clarity and fostering a dialogue between the two disciplines of design and marketing, we will use the terms "designers" and "marketers" in this article to refer to the practitioners of these fields in all their diversity.

as poverty, war, racism, environmental degradation…" (Derbaix, 2022). The social marketing movement (Kotler et Zaltman, 1971), then, established objectives that were : "beneficial to society and the environment" [4]. Focusing in particular on social purpose organizations or the non-profit sector (Le Nagard et Giannelloni, 2016 ; Parguel *et al.*, 2018), it develops methods to encourage behavioral change (Gurviez et Sirieix, 2017). These issues are reflected in *Transformative Consumer Research*, a marketing research movement encouraging contributions aimed at improving consumer well-being and quality of life (Mick, D *et al.*, 2012). Today, the French Marketing Association (AFM) includes the notions of : "*sustainability*" and consideration of "*the consequences*" of its practices "*on society at large*" in the definition of its discipline [5] (Le Nagard et Giannelloni, 2016).

1.3 The user, the consumer: human-centered approaches

Design and marketing share an approach centered on the user (for the designer) or the consumer (for the marketer), with the aim of meeting their needs. The study and understanding of behaviors, lifestyles, habits and daily life is the common basis of both disciplines, in terms of both research and practical application. Vocabulary and methods differ, but the approaches complement each other.
Planned obsolescence (the first nylon stockings were very resistant [6]), misleading pricing strategies (promotions), packaging (shrinkflation[7]) and communication (packaging or advertising), or the creation of desires by brands (through minor innovations or systematic renewals of product ranges)… are all deleterious practices, obscuring people's real needs. However, these two fields of study can work together to focus on human beings and the definition of their needs, by applying their theoretical frameworks and methodological tools to the task of adapting lifestyles to environmental and social emergencies. Today, more than ever, they must respond to environmental challenges.

1.4 The study of signs and mental representations: the influence of culture and identity on behavior

The visual and symbolic dimension is crucial in the discipline of design. Distinct from the arts in its : "*applied aesthetic*" dimension (Bauhaus) (Findeli et Bousbaci, 2005), its aim is to offer a response to a problem of use. In this discipline, the search for form and line goes beyond purely aesthetic considerations. By studying signs and taking into account the symbolic power of a shape, an object or, more generally, a system or a social interaction, the designer or marketer can identify possible solutions that will meet the needs of the target user/consumer. When confronted with a stimulus, an individual mobilizes his or her mental representations. A concept stemming from social psychology (Moscovici, 1961), mental representations enable the stimulus to be interpreted (via perception), then categorized according to the individual's mental schema of reference. This cognitive

[4] Association Française du marketing, page du groupe d'intérêt thématique "Marketing social et changement comportemental" : https://www.afm-marketing.org/git-marketing-social-et-changement-comportemental.html
[5] Définition of marketing according to l'Association Française du Marketing : https://www.afm-marketing.org/presentation-de-l-afm.html

[6] *Prêt à Jeter,* Documentary, Réalisation Cosima Dannoritzer, Arte France, minutes 35 to 40.

[7] is the term used to define the business practice where the price of a product increases or remains the same, while the quantity sold decreases (*Shrinkflation : obligation d'informer les consommateurs sur les produits concernés au 1er juillet !* Publié le 07 mai 2024 - Mise à jour le 29 juillet 2024 - Direction de l'information légale et administrative)

process of : "*slicing up the world*" groups objects according to specific criteria, which are then treated in an equivalent way (Tijus et Cordier, 2003). Categorization varies according to human groups, with each culture creating a system of division corresponding to its own environment (Dortier, 2014). Culture itself is defined as information widely shared across a population, taking the form of mental representations (in the brains of individuals), and social representations, (behaviors and various artifacts in their environment) (Sperber, 2005).
Marketing and design can work together, using formal and symbolic codes to convey information and influence behavior (Silayoi et Speece, 2007 ; Thaler *et al.*, 2010). The marketing approach of consumer culture theory considers the ideological, social, cultural and symbolic dimensions of consumption (Arnould et Thompson, 2005). The use of codes and symbols can have an impact on perceptions, interpreted according to the individual's representations (Gallen, 2005). In the food domain, categorization will generate positive or negative attitudes on the part of the individual, and the adoption of a behavior of engagement or avoidance towards the food (Gallen, 2005). Facilitating acceptance of a particular product by, for example, making a new element familiar, or, on the contrary, giving a new dimension to a known element (Voglaire, 2020) are suggested paths to explore.

2.Projection of doctoral research in design and consumer behavior

2.1 Research context: the cultural specificities of food in a context of protein transition

Human food system has a significant impact on both the environment and health (Willett *et al.*, 2019). Reducing meat consumption is one of the major challenges in the transition to a more sustainable food system (González et al., 2020), but translating these intentions into concrete changes is slow in coming. In many countries, and particularly in France, reducing meat consumption is hampered by a number of obstacles. Far from being limited to the question of production (the available supply), this issue depends on a global system, and in particular on the uses, lifestyles and habits of consumers. Eating habits are not rational, and are strongly influenced by cultural factors. The act of eating, by virtue of its recurrence in everyday life, is a privileged medium for social relations, and by extension, culture. Every world's food culture includes a systems of rules, with their food categories, norms and prohibitions, separating what is edible from what is not (Fischler, 1990). Food choices are therefore not simply the result of deterministic logic (availability of a food), but are the fruit of cultural constructs, with their associated representations and imaginaries (Poulain, 2008). The symbolic aspect of food is decisive (Fischler, 1990 ; Rozin, 1988) and eating practices are profoundly shaped by the local cultures of eaters and their migrations (Sanchez, 2009). Eating habits are always made up of subtle cultural mixes, representative of each eater's identity (James, 2003). Meat is a highly valued product in French food culture, and occupies a central place in its gastronomy. At the same time, French people are very attached to the notion of terroir, and to the geographical origin of products and recipes. However, most of the alternative products and recipes to meat available today come from distant culinary cultures, sometimes

unknown to eaters and difficult to integrate into their eating habits. The doctoral research currently underway explores this question and seeks to determine to what extent the eater's food culture can become a lever for acceptance of a less meat-based diet.

2.2 Academic research by design: which contributions?

The practices specific to designers in a research context are plural subject of ongoing efforts of inventory and identification (de Mourat *et al.*, 2015). We are continuing this process through this doctoral work by adopting a designer-researcher posture and implementing various research methodologies and tools. Working on complex objects, in a context of hybridization of disciplines and according to a principle of iteration, also offers new questions for disciplines hosting design research (de Mourat *et al.*, 2015). At the crossroads of design and consumer behavior, the research posture adopted in this doctoral work will also be able to contribute to discussions in marketing research through its singularity and its departure from the discipline's "*dominant paradigm*"(Parguel *et al.*, 2018)[8].

2.3 Project-grounded research methodology

Project research is a methodology for research through design - as distinct from research on design (design as the subject of research) or for design (research prior to a design project) - that is : "*both scientifically rigorous and fruitful for the profession and users*" (Findeli, 2005). It proposes the development of a design project within the research process, leading to the production of artifacts. This production enables the researcher's active participation in the field, and makes it possible to : "*study a research problem through the context of action*" (Gagnon *et al.*, 2021). The aim is twofold: project research enables both a proposed design response to the research question and the production of scientific knowledge.

2.4 Design practice as a method of observation and data production

Various design doctoral research projects have brought to light examples of specific practices creating a dialogue with their host disciplines, notably observation and data production (de Mourat *et al.*, 2015). Here, we will consider the complementarity of design and consumer behavior research approaches. Certain tools are common to both disciplines, such as observation, interviews or visual anthropology, to which design brings an iterative dimension (back and forth between fieldwork and research), enabling research hypotheses to be tested (by means of artifact production) by users.
Following a review of the current state of the art, this doctoral project, based in Bretagne region (France) will focus on identifying specific markers this food culture, with particular attention paid to the place of meat and plant foods. To this end, a logbook will be

[8] Parguel et al. They develop the hypothesis that the dominant norms (Bourdieu, 1976) in marketing research (namely, the focus on organizational performance and the positivist research paradigm – using statistical tools, seeking objective and context-free knowledge…) propagated in pre-doctoral and doctoral teachings, and shaping the criteria for publication in the leading journals of the discipline, explain the slow and limited emergence of the social perspective in recent marketing research.

distributed to participants. For three weeks, this diary, to be filled independently by participants, will aim to collect data their daily food practices, using graphic tools to make it easier to fill in the information. Following the analysis of these notebooks, we plan to conduct interviews and observe participants in their homes, including during the preparation of a Breton recipe. Photography, drawing and audio recordings will be used to draw up an inventory of the ingredients and their provenance, the utensils and tableware (crockery, textiles, etc.) owned and used by the participants, their daily and festive recipes, and related gestures, tips, stories and anecdotes. Interviews will also be conducted with various professionals connected with the region Bretagne and the subject of diets vegetalization (chefs, producers, heritage managers…). Using a research-project methodology, we plan to produce tangible artefacts (recipes, utensils, tableware featuring markers of Breton food culture) to be tested in situations with users. The aim of these situations is to produce data (collection and recording of tests and user reactions = video/audio/textual/illustrated transcriptions, etc.). Here, the designer can particularly apply his creative and sensitive skills, proposing new angles of observation. He or she is also able to develop tools adapted to the participants and the context, in terms of form and content, for observation and data collection. The restitution of this data, and more broadly of this research work, is envisaged in different formats, (edition, exhibition…) enabling communication to different publics.

2.5 Projecting research design

Chronological projection (Figure 1)

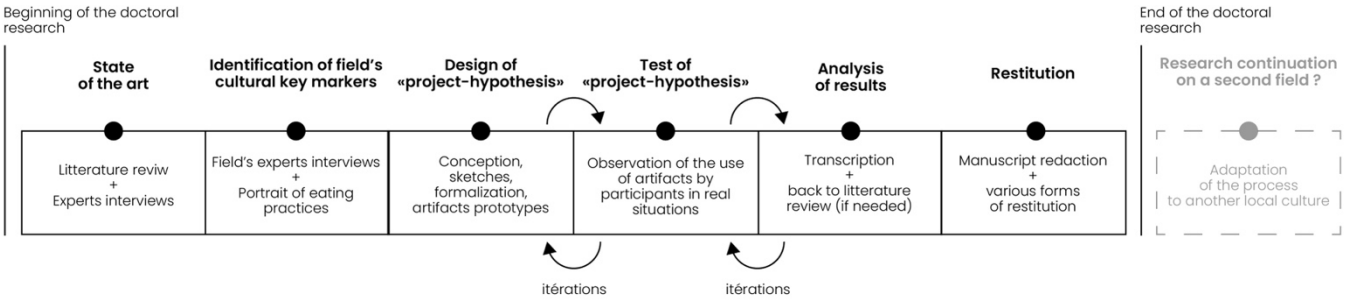

Figure 1. Chronological projection of the doctoral research.

Projected methodology by activity type, objectives and tools according to the matrix of (Gagnon *et al.*, 2021) :

Activity type	**Description**	**Objectives**	**Tools**
State of the art	> Littérature review > Expert's interviews on the topic of cultural identities and plant-based	> Identify challenges, barriers, and drivers > Analyze the influence of local cultural identity on	> Reading articles and publications in the fields of marketing and design, and social sciences at large > Interview guides

	transition of diets	eating practices	> Audio recording and interviews transcription
Bretagne's food culture markers identification	> Expert's interviews on the topic of Bretagne's culture > Survey of eating habits and interviews	> Define a current portrait of eating practices in Bretagne > Identify key markers in eating practices	> Interview guides > Food diary / logbook > Audio recording and interviews transcription > Photographing fridges and cupboards of participants
Design of food « project-hypothesis »	> Project design (artifacts)	Formalisation, making pathways tangible	> Sketches, prototypes
Test food « project-hypothesis »	> Presentation of artifacts to participants and observation of usage	> Test design projects in real usage situations	> Observation > Interview guide > Audio recording and interviews transcription
Analysis of results and writing	> Identification of theoretical, methodological, and managerial contributions > Manuscript writing	> Transcribe and present the research process and results	> Manuscript > Graphic visualization of the process and results

Conclusion

Throughout this doctoral research, epistemological and methodological questions have emerged from the intersection of the disciplines of design and consumer behavior. We have attempted to highlight the points at which design and marketing converge: questions regarding their respective purposes, the central role of the user/consumer, and the importance of perceptions, representations, and identities—particularly cultural ones. These commonalities between marketing and design suggest the possibility of future epistemological and methodological contributions. Moreover, the integration of design and marketing (more specifically, consumer behavior) appears to provide a relevant framework for exploring these hypotheses.

This research aims to contribute to the ongoing reflection on the role of design within academic research, following in the footsteps of designers-researchers. We also intend to examine the contributions of this unique posture to the broader debate on the environmental and societal purposes of marketing research. It will be essential to analyze the extent to which the disciplines of design and marketing intertwine within this research process, and to identify the respective contributions of each discipline, as well as the value and characteristics of their synergy. Care must be taken not to compartmentalize the approach by relegating marketing research to literature reviews and qualitative

interviews, and design to projects development. Instead, we aim to pursue a genuine hybridization of these two fields, while remaining open to insights from across the social sciences and humanities—anthropology, sociology, psychology, history, and beyond.

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ATTUNING TO THE DESERT: SITUATED DESIGN EDUCATION THROUGH THE LENS OF ARIDITY

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ABSTRACT | The paper discusses the work developed during an undergraduate design course, where students were asked to explore the relationship between product design and a given environmental context in the UAE. It aligns with the "Regenerative City and Territorial Development" track by providing theoretical and practical insights into the connections between materials, production processes, and the ecological and socio-cultural context in which they exist or take shape. The methodology primarily involved a three-step design process: (1) Sensory Ethnography, (2) Data Visualization: Mapping as World Sense-Making, and (3) Prototyping: Making as Synthetizing Knowledge. Field work involved site visits to the Al Qudra desert to understand local ecology, resources, and environmental challenges. Students conducted ecological mapping and sampling, and temperature measurements while studying Bedouin culinary traditions for insights into sustainable practices. During the course, students were asked to deliver a data visualization mapping the relationships observed on-site, which informed the development of a concept, followed by prototypes of various sizes and materials, and ultimately a finalized design. The outcomes of this research are presented through four distinct student projects—cooking devices, utensils and experiences developed to function in a desert environment—each exploring a unique speculative approach to integrating ethnographic environmental research with design practice. The work also includes a booklet of new recipes, based on the

student's understanding of local ingredients and traditional methods. They were chosen to represent the best practices from each group, and as empirical evidence for developing an initial methodological framework to be used in contextual environmental design research. The results show that incorporating a situated approach to design, along with digital tools and fabrication, can help develop design work that is not only connected to the environment but also benefits from its settings. The paper also explores how anticipating the contextual use of heat can inspire alternative energy systems for disadvantaged areas, while addressing ecological and social challenges by integrating environmental sustainability and cultural preservation, to develop resilient and equitable solutions for urban and territorial transformation.

KEYWORDS | DESIGN EDUCATION, SITUATED DESIGN, DIGITAL TECHNOLOGIES, DESERT COOKING, ENVIRONMENTAL THINKING

1. Introduction

> "Water, water, water.... There is no shortage of water in the desert but exactly the right amount, a perfect ratio of water to rock, water to sand, insuring that wide free open, generous spacing among plants and animals, homes and towns and cities, which makes the arid West so different from any other part of the nation" (Abbey, 1968).

This paper explores how design education can respond to ecological and social challenges through direct engagement with arid landscapes. Focusing on a second-year undergraduate studio taught at the Dubai Institute of Design and Innovation (DIDI), it examines how students learned to design *with*, rather than for, a desert environment—drawing on local materials, environmental processes, and community knowledge to inspire sustainable, situated design practices (Blanco, 2022; Attia, 2016; Sardana et al., 2024).

When imagining the desert, dominant narratives often evoke vast, pristine territories—spaces of absence rather than presence. In contrast, this course proposed to rethink the desert as a socio-technical environment, whose settings are shaped by context-specific ecological rhythms and modes of cultural adaptations. Drawing on insights from ecological design, postcolonial theory, and more-than-human ethnography, we encouraged students to move beyond deficit-based thinking and engage with the desert as a rich, complex, generative environment.

The studio course, titled *Materials in Human Experiences*, invited students to research portable solar-powered cooking devices, tools, experiences and food recipes for deployment in a desert setting. Each team contributed to a larger collaborative effort, exploring speculative design ideas for a desert ecosystem. What began as an apparently simple prompt— to design a cooking device for the desert— opened other, deeper questions: how do we cook without access to water

or fuel? What forms of knowledge are embedded in local traditions? How can environmental forces such as sun, sand, wind participate in the design process? Students engaged in fieldwork at *Al Qudra*, a sandy desert located 30 km from the center of Dubai, where they studied adaptations to environmental constraints—high temperatures, vegetation, and animal species. Through mapping, multisensory ethnography, and prototyping, they were asked to read the desert as an ecosystem subjected to a multiplicity of relational agentic forces.

This paper explores how environmentally situated design pedagogies can challenge universal design paradigms and foster more plural, context-responsive futures. By negotiating between environmental constraints and cultural affordances, between technological possibilities and ecological boundaries, the course repositioned design as an act of listening, attunement, and negotiation, and framed it not just as a set of outcomes, but as a way of engaging with the world.

2. Reframing Aridity

Scholarly work in the field of Ecosophy suggests that the human failure to perceive our interconnectedness with the environment stems from a culturally and socially constructed separation of the self from the rest of the world (Næss, 1973). Norwegian mountaineer-philosopher Arne Næss argued that genuine ecological care only becomes possible when we transcend an individualistic, ego-centered view of the self and embrace an eco-self—one that is embedded within and responsive to broader ecological relationships. This position fosters the capacity to think like—and care for—nonhuman others. Such a shift in worldview has been explored through the lenses of Multispecies Ethnography (Kirksey & Helmreich, 2010; Ogden et al., 2013), More-Than-Human Design (Giaccardi & Redström, 2020; Gatto & Cadamuro, 2021), Bio Design (Myers, 2012) and Eco Design (Fallan, 2022). These fields challenge anthropocentric design paradigms and advocate for a mindset that sees all living and non-living entities as relational forces within ecological systems. Even fields like sport and outdoor, saw the developed of clean climbing equipment—like the hexcentric nut (Fallan, 2022)—designed to account for and respect the rock, avoiding damage to its surface:

> “Make the rock happy - use a nut. To place a nut, you must begin by thinking about the shape of cracks. Right from the start clean climbing demands increased awareness of the rock environment” (Chouinard & Frost, 1972).

Engaging with ecological and social challenges implies inhabiting the real world, becoming part of new relationships that are formed during the experience and shaped by the meanings they produce. Donna Haraway refers to the result of these meaning-making processes as “situated knowledges” (Haraway, 1988). Following Haraway, Simonsen et al. (2014) argue that all forms of design are situated, being based on processes that emerge within specific social settings and are carried out from an "embedded" position (Simonsen et al., 2014, p. 6). Situated knowledges are key to cultivating the notion of eco-self advanced by Næss: by refusing to distance

the knowing subject from what one seeks to know, such form of knowledge emerge from specific pathways and subjective stances, contributing to the formation of relational identities.

The Materials in Human Experiences course departed from an understanding of ecodesign as a universal practice, foregrounding the need to engage with ecological crises through situated, socio-cultural, historical, and lenses (Escobar, 2018; Manzini, 2015). By promoting a relational lens to engage with the desert, the aim of the course was to reframe aridity—not as lack or scarcity—but as a dynamic and resilient state of ecological balance.

From a postcolonial perspective, the desert is not merely a biophysical environment but a cultural and political space, deeply mediated by histories of imperialism. European colonial powers often cast arid landscapes as blank mileux: uninhabited, uncivilized, and thus ripe for occupation and transformation. This imaginary rendered deserts as non-places—deprived of value unless made productive through irrigation, mining, or industrial development. Such epistemologies erased the complex relationships that Indigenous, nomadic, and nonhuman communities had long cultivated with these ecosystems. This logic of ‘terra nullius’—land considered legally unoccupied and available for appropriation—has been used as both a juridical tool of colonialism and a cognitive framework that fed modernist development and design ideologies (Henni, 2022). Architectural historian Samia Henni (2022) has shown, for instance, how the French colonial administration in North Africa framed the desert as both a frontier of conquest and a site of architectural experimentation, fusing military strategy with environmental manipulation. These views have been carried forward into the present day through infrastructural geo engineering projects, mega solar farms, and resource extraction operations that often displace or bypass local ways of life (Henni, 2017).

Design education that engages with desert ecologies must, therefore, confront these colonial inheritances. This means not only recognizing how certain narratives of aridity have served geopolitical and economic agendas, but also actively recovering vernacular, Indigenous, and other-than-human ways of relating to place. The course demanded a move away from extractive logics toward more participatory, attuned modes of inquiry. Students were encouraged to consider solar energy, wind, and material cycles not as resources, but as collaborators in their design work. Approaching design research from a situated, relational, practice-based perspective does not come without concerns. This mode of positioning designers, for instance, contradicts more established traditions of research as a systematic, positivist, inquiry-driven process (Gaver et al., 2022). This also applies to the context of design education, where students are often trained to approach design from a problem-solving perspective within studio or workshop environments—settings that physically and conceptually distance them from the problems they are asked to 'solve.' This separation arguably prevents students from engaging with complexity and fails to expose them to lateral, critical thinking. The question of what implications a situated approach to design might have on

design students—and their capacity to develop relational awareness—remains largely underexplored.

3. Methodological Approach

The class consisted of 3 hours per week, with students divided into teams of 3 to 6 participants. The methodology involved a dynamic exchange of information using various methods and research techniques, allowing students to develop a personal mode of inquiry toward the environment. The course was structured into three interconnected phases: sensory ethnography explorations, data visualization and prototyping.

3.1. Situated Design in Undergraduate Education

Practitioners of situated pedagogy and Situated Learning (Jean & Wenger, 1991) draw on traditions of experiential education to support the value of direct experience within the design process. The brief provided to the class, along with the designated site, outlined the types of designs students could develop, and possible modes of engagement with the geographical area. Between the others, the brief mentioned: portable solar-powered devices for cooking in the desert, tools for preparing or eating food, new recipes based on the use of local ingredients and informed by traditional methods. The expected outcomes were intentionally kept open to avoid prescribing specific directions for the design work.

3.2. Sensory Ethnography

Ethnography (Plowman, 2003; Van Dijk, 2010) and Autoethnography (Lehtonen & Gatto, 2020; Pink, 2011) have become a central practice for design. Doing fieldwork is a valuable mode of active ethnography (Bryman, 2012) as it provides opportunities for unfiltered hands-on experiences where the researcher can observe and frame a personal understanding of a given situation. Sensory Ethnography is the method proposed to students during the first phase of the course. Rooted in phenomenological anthropology, sensory ethnography stresses the multiple ways in which smell, taste, touch and vision can be interconnected and interrelated within field research. The ethnographic session consisted of one main visit to the site, which lasted approximately three hours. Before reaching the site, students split into teams of three and received suggestions about different tactics that could be used to collect evidence of their observations. Apart from traditional approaches involving the use of on-site field notes (Bryman, 2012, p. 447), students were encouraged to engage with experimental practices involving multisensoriality (Pink, 2011); exploring, for instance, the movements of living entities; heat and humidity; sampling on-site materials; collecting environmental audio-visuals evidence; annotating diaries; sketching; and interacting with local dwellers. For all students, this was the first experience of ethnographic research on a site dislocated far away from the University Campus.

3.3. Data Visualization: Mapping as World Sense-Making

By suggesting the employment of Mapping (Powell, 2010) as a research instrument, the objective was to guide students to engage with site-specific research from a visual perspective. Using mapping as a qualitative tool can lead to "evoking the lived experience of social, cultural, and political issues related to place" (Powell, 2010, p. 539). Building on Powell, mapping was proposed to students as "a multisensory research method in terms of its ability to evoke relationships between place, lived experience, and community" (Powell, 2010, p. 539). By the end of the first project's phase, each student team was asked to deliver a data visualization that mapped the relationship encountered on-site and further studied by the students. We purposefully asked not to simply map actors but to focus on relationships as a mode for students to make sense of the dynamics at play within the studied desert patch.

3.4. Prototyping: Making as Synthetizing Knowledge

During the prototyping phase, each team progressed from initial sketches to technical drawings and three-dimensional models. The integration of digital tools, such as Rhino and SolidWorks (Ikubanni et al., 2022), alongside digital fabrication processes like laser cutting, 3D printing, and CNC machining (Soomro et al., 2021), facilitated the exploration of manufacturing-related challenges in relation to materials and processes investigated in earlier design stages. Moreover, these technologies enabled the precise and detailed production of both low- and high-fidelity prototype (King, 2019).

Low-fidelity prototypes were initially produced in various sizes and materials, including cardboard, blue foam, and MDF. This iterative approach allowed students to refine their ideas before transitioning to more durable materials (Goudswaard et al., 2023). Rapid prototyping methods helped students grasp the project's complexity and assess the functionality of their concepts in real-world settings. As the process advanced, students refined their prototypes by considering sustainability, ergonomics, and cultural relevance, culminating in the development of high-fidelity prototypes.

Beyond enhancing communication among students and between students and professors—by enabling the exchange of multiple layers of information—prototyping played a crucial role in translating abstract concepts into tangible artifacts and experiences. It served as a key medium for synthesizing design ideas into concrete, testable forms.

3.5. Reports and Evaluation Methodology

The paper follows a double reflective process involving professors and students. Each team submitted an initial report on the design process, including a reflexive essay. The professors reviewed the reports according to their own understanding of the work, and returned the reports to the students including feedback. Students were then asked to re-edit their corresponding texts and added parts they thought were meaningful or missing. The final text incorporated a multiplicity of viewpoints

and layers of analysis: professors were able to analyze the student's comprehension of design process, while students simultaneously engaged with and reflected on the professors' perspectives and indications. This allowed a give-and-take of information between teachers and students, and aided meaningful reflections upon the meaning-making processes involved during the course.

4. Results

In this section, we analyze four of the most representative students' project, each representing a unique direction for blending ethnographic environmental research and design practice:

- Direction 1: *Environmental Probes* – observing, designing, and leaving behind probes, similar to cultural probes but focused on environmental contexts.
- Direction 2: *Multisensory Experiences* – designing through the senses, particularly sight and taste.
- Direction 3: *Feeling and Sensing* – exploring the cultural and material properties of environmental phenomenon (e.g., heat) through socio-cultural and environmental sensing.
- Direction 4: *Material Transformations* – using local resources as new mediums for design experimentation.

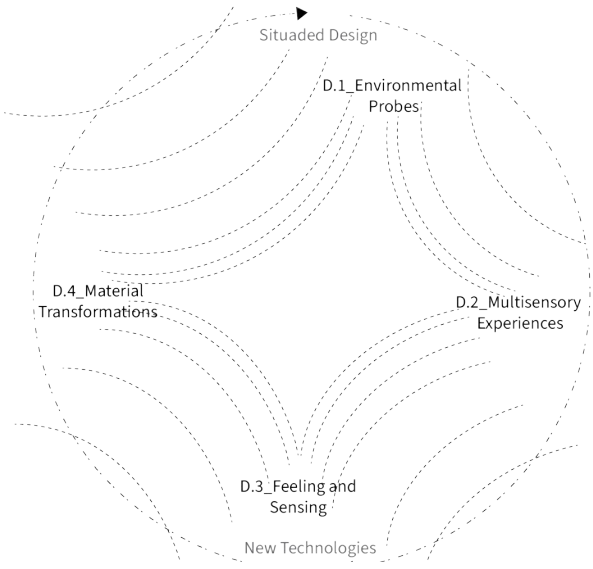

Figure 1. Diagram of the four design directions initially followed by the students' teams.

4.1. Trap N Cook

Trap N Cook belongs to a group of projects where students conducted initial fieldwork by designing environmental probes, hence following direction 1. This technique was inspired by Gaver and Dunne's notion of Cultural Probes (Gaver et al., 1999), a design research method aimed at inspiring and gathering qualitative, context-specific insights from participants in an open-ended, exploratory manner. Cultural probes are designed to be left behind, gathering information without the direct presence of the designer.

The environmental probes designed by the students had an initial similar purpose, yet they collected environmental inputs. During the visit to the desert site, students attempted to collect vegetal and abiotic components and researched local animal species to learn about the desert site's ecology. Multiple probes designs were initially designed and left on site. The first two used shoe boxes with different baits, covered with cling film and a hole on top to allow ants, insects, and beetles to enter. The third design used a water bottle, cut to create a funnel shape that directed potential insects inside the bottle, attracted by date syrup.

Figure 2. Environmental probe 01: white box, environmental probe 02: dark blue box, and environmental probe 03: cut bottle.

The conducted exploration led to research on the nutrients required for a balanced human diet, followed by the categorization of local plants and animals. The system was designed with desert insects and fauna in mind and was combined with desert plants to meet human nutritional needs.

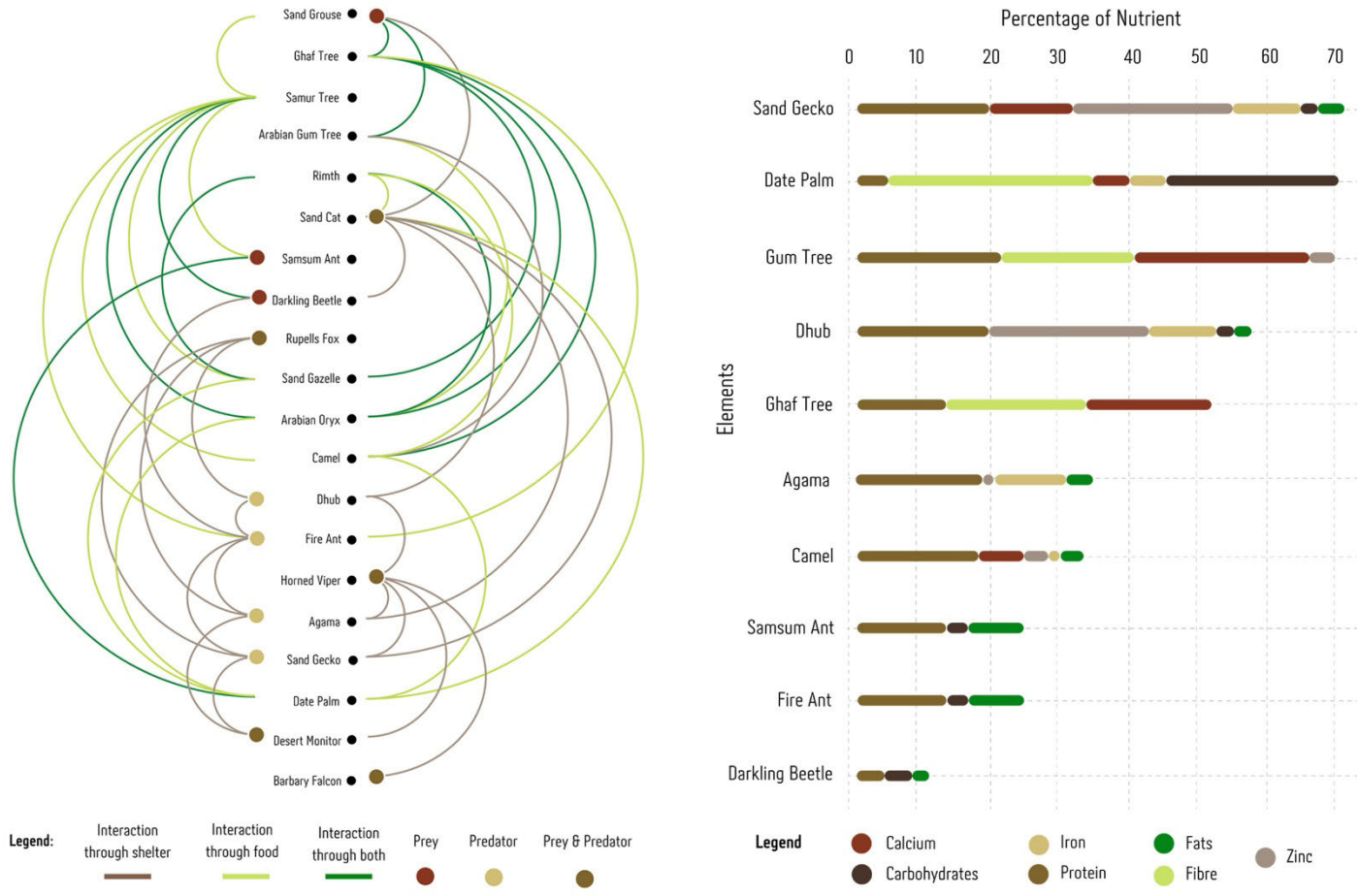

Figure 3. Data visualization illustrating the interaction of animals on-site and their nutrient percentages.

Interestingly, during the project's development, the designed probes evolved into functional cooking devices. The most efficient ones were selected and integrated into a purposefully designed grilling system, allowing animals to be captured and cooked on-site. A prototype was built using cardboard and foam, and later refined into a metal box with a reflective lid, to enhance the heating process -similar to the functioning of a kitchen oven.

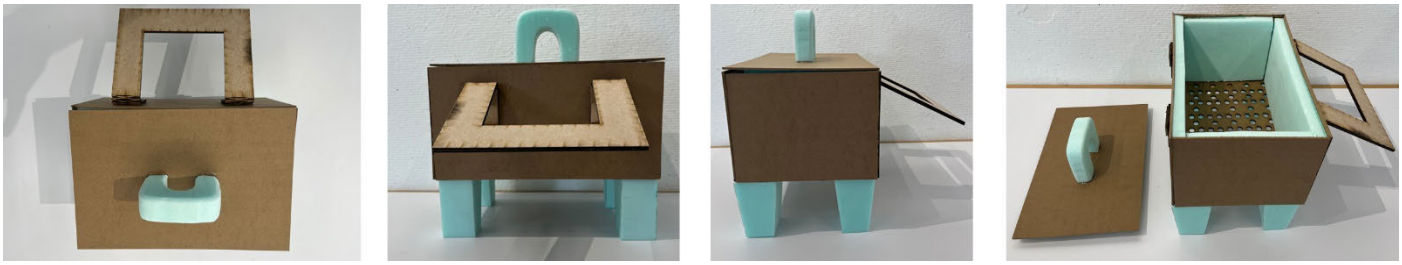

Figure 4. Prototype of the cooking device made from cardboard and foam.

Figure 5. Final prototype of the cooking device.

Figure 6. Final prototype of the cooking device, featuring colored animals to illustrate its working mechanisms.

4.2. Veggie Cooking

The second project, which follows direction 2, belongs to a series of works that borrowed Pink's idea of multisensoriality (Pink, 2011). Initially originated in the phenomenology of perception, the concept assumes that the human body is not just a collection of adjacent organs, but a synergic system whose individual organ's functions are linked together by the very act of "being in the world" (Pink, 2011, p. 123): in essence, each sense function in a continuum with the others.

Veggie Cooking is a project about edible desert flora. Students spent the fieldwork time observing, smelling, identifying and finally tasting plants on-site. Trees such as the Ghaf, the Toothbrush tree, the Saltbush shrub, which hold cultural as well as medicinal value in the UAE, were explored and subsequently adapted as main ingredients of traditional Emirati recipes, to form dishes with different textures and tastes.

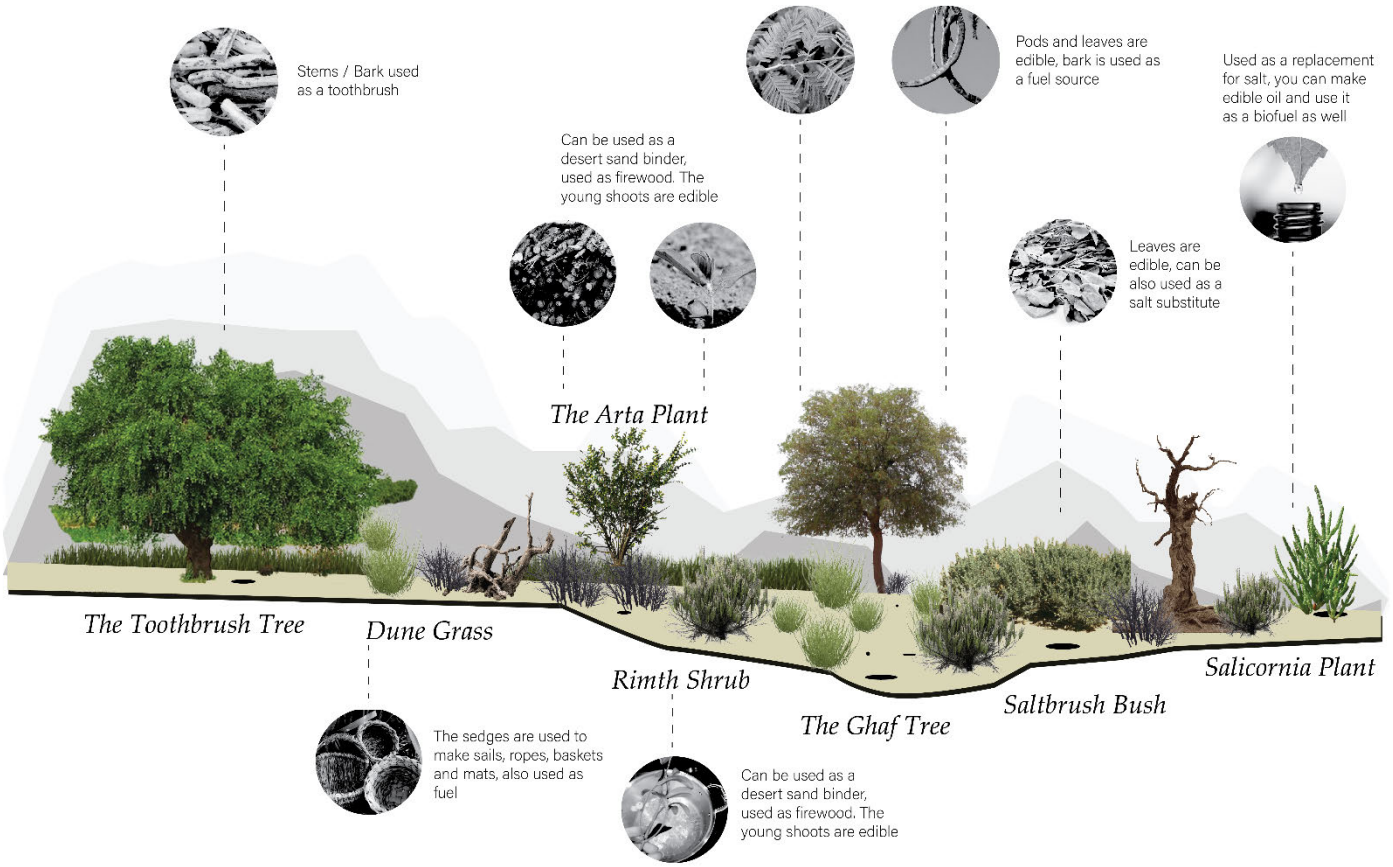

Figure 7. Diagram of the main plants found on-site.

The project was inspired by a traditional method of heating stones to boil water. Students used a Fresnel lens to direct sunlight into a metal container with a concentrator to enhance heat and heat the stones placed inside. Once the stones were heated, they used them to boil water and cook local ingredients and leaves for soups and salads.

Figure 8. Reference image of traditional cooking with stones and the food recipes proposed by the students.

Cardboard prototypes were created to test different proposals. The final design featured a hexagonal-patterned steel body with four compartments for heating stones. The Fresnel lens was mounted on a swing arm, allowing precise adjustment to focus sunlight on the stones. To facilitate the use of various types of leaves, a 3D-printed leaf grinder made with wood-based filament was created.

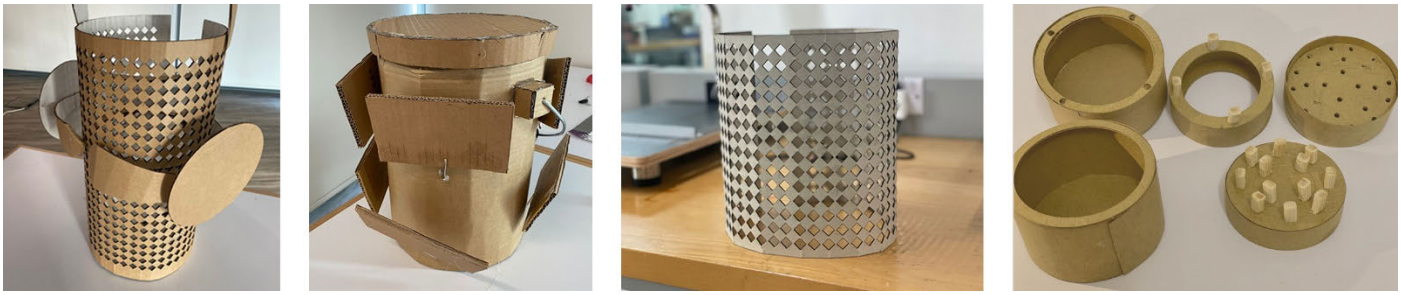

Figure 9. Cardboard prototypes of the cooking device and the leaf grinder.

Figure 10. Final prototypes of the cooking device and the leaf grinder.

4.3. Cooking with Sand

The third group of projects brings together student work that explored environmental data under the lenses of situated social settings. Following direction 3, we called this approach socio-environmental sensing, to underline the strong ties that were found between the nature of on-site materials and their cultural readings. Accordingly, students explored materials for their physical as well as cultural properties.

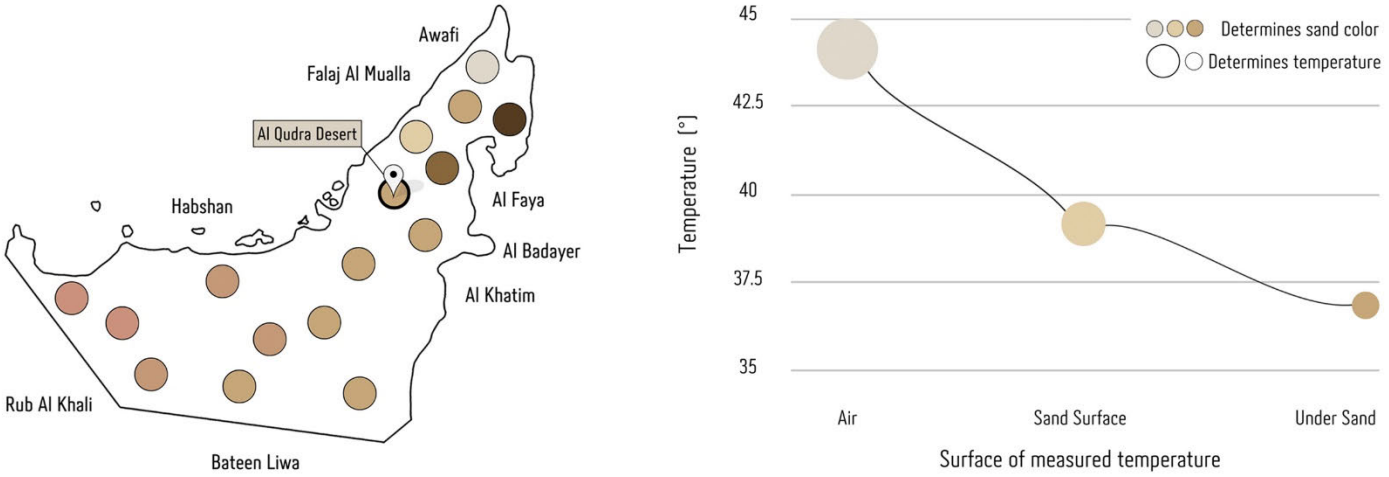

Figure 11. Diagram illustrating that 80% of the UAE consists of desert land and highlighting variations in sand colors, and data visualization showing the relationship between sand color and temperature.

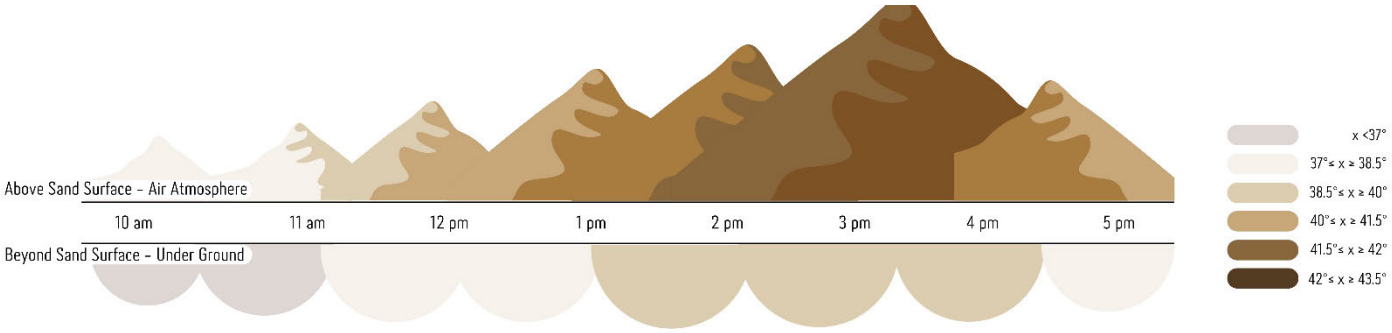

Figure 12. Data visualization showing the temperature variations of the atmosphere at different times of the day.

The project *Cooking with Sand* draws inspiration from Bedouin cooking traditions, which use desert sand as a heat source. Students conducted fieldwork to better comprehend sand as a material, how its color influences temperature, and mapping variations across the desert patch to identify optimal conditions for cooking on sand.

The presented outcomes involved a series of recipes inspired by traditional Bedouin dishes and the design of a portable device that could be easily assembled and disassembled, making it suitable for use in the desert. Cardboard, MDF and clay prototypes were created to test different proposals. The final device is equipped with a Fresnel lens to concentrate sunlight onto a central cooking pot filled with sand, which then distributed heat to smaller clay pots containing the food.

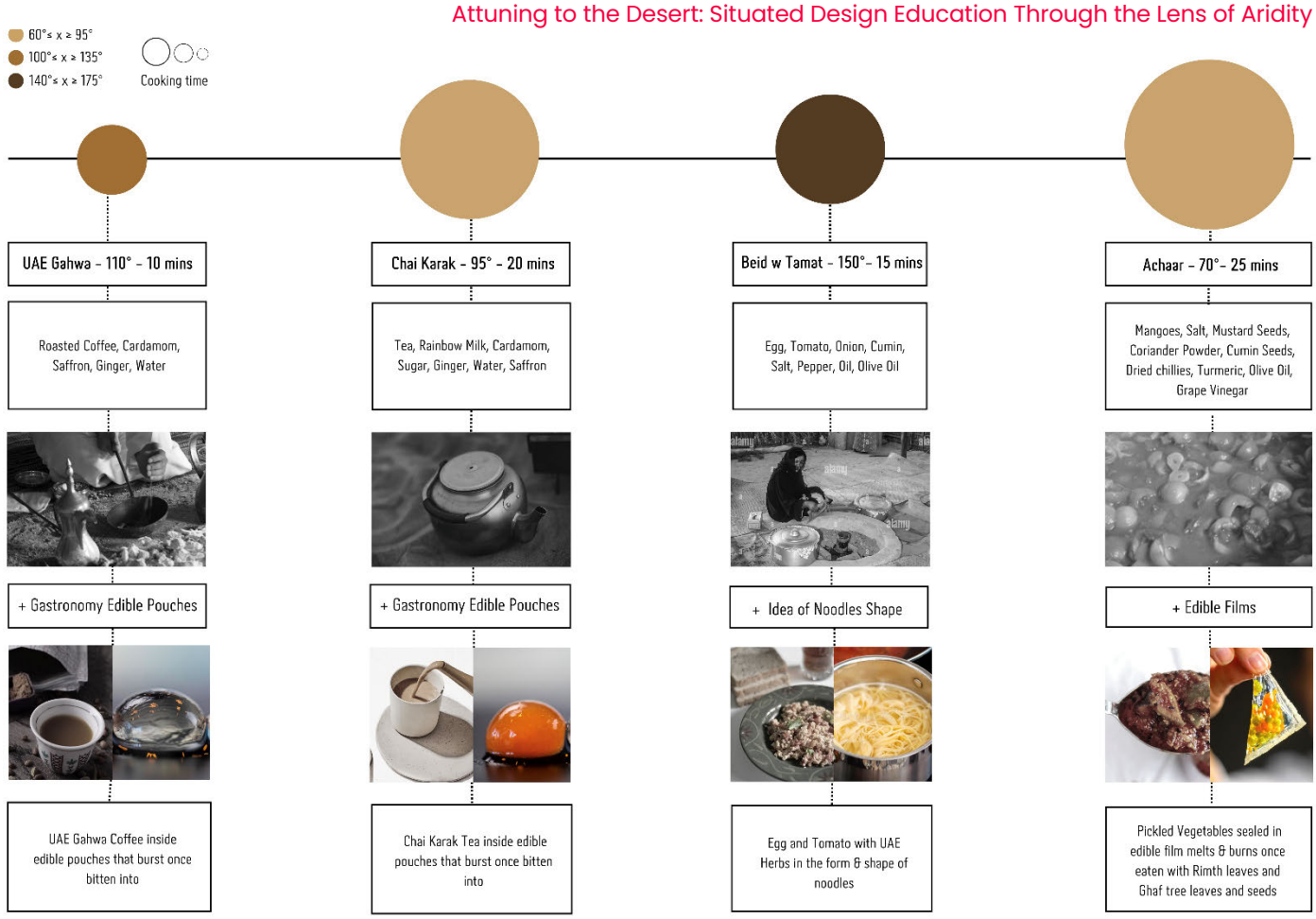

Figure 13. Diagram of traditional vs. student-proposed cooking times and temperatures.

Figure 14. Prototypes made from cardboard, clay, and paper.

Figure 15. Prototypes of various materials and a backpack for transporting the cooking device.

Figure 16. Final prototype disassembled and assembled.

Figure 17. Final prototype showing the clay pots for food preparation.

4.4. Rimal

The last group of works developed by students had the objective of transforming in-situ entities into production materials, aligning with direction 4. In these cases, local resources became the primary medium for developing new materials and fabrication techniques. In many of these projects, students felt compelled to incorporate additional additives to enhance the properties of the materials or refine the design process. These supplementary 'ingredients' were often sourced from outside the fieldwork site, posing questions about the contextual relevance of the final design outcomes.

The Rimal project challenged the idea that cooking must necessarily result in edible outcomes. Rimal, in Arabic, refers to the sandy terrain in desert regions. The project reimagined sand, combined with on-site plants and other elements, as a potential 'ingredient', offering sustainable alternatives to plastic tableware by emphasizing local resources and bio-entities.

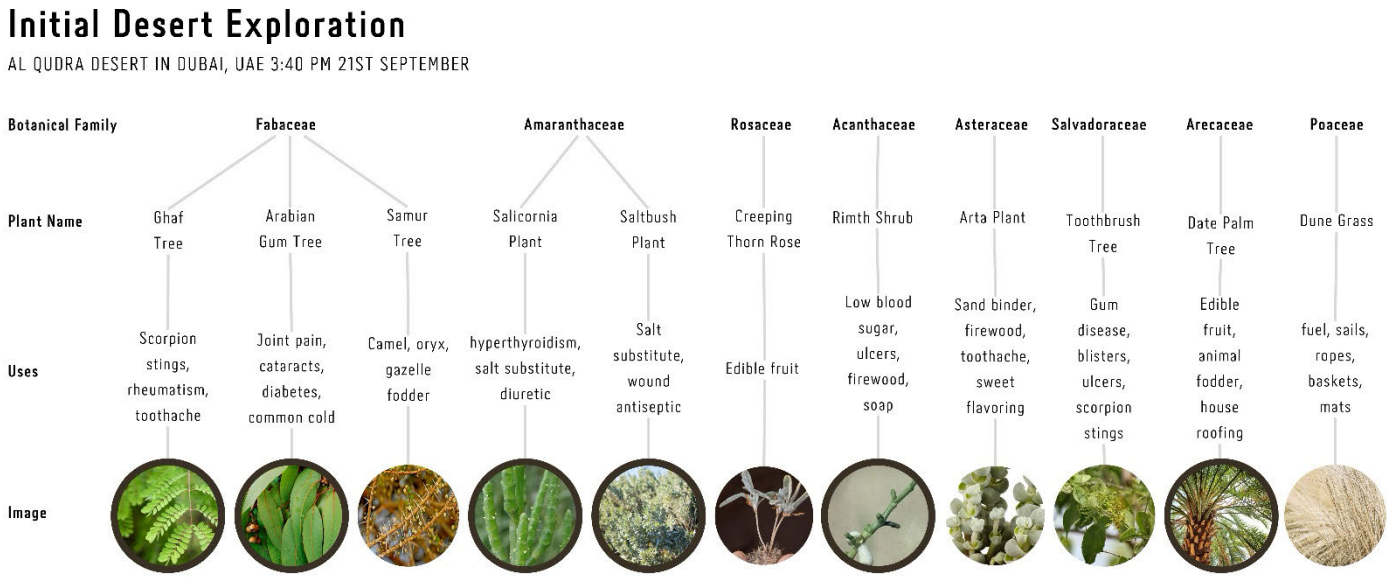

Figure 18. Diagram of key plants found on-site that could be used as ingredients alongside sand.

The project process began with hypotheses and iterative testing, adjusting ingredients to assess functional and aesthetic qualities. Cornstarch, aloe and egg whites were tested for material resistance, while turmeric, sumac, charcoal and Ghaf tree leaves were explored as natural colorants. The final recipe combined sand, okra, and lime in a 40:50:20 ratio, resulting in a moldable paste for crafting cutlery and plates that could be "baked" over an open fire on-site.

Students focused on local materials, avoiding colorant additives. To explore the aesthetic variations of sand, however, they collected samples from multiple locations across the UAE, recording GPS coordinates. These samples revealed unique color tones, reflecting the geographical identity of each artifact.

Figure 19. Samples of sand with various colors and textures.

The kit developed for the project included laser-cut wooden stencils designed to be wrapped around wooden sticks. The stencils were filled with the sand mixture and heated over a fire, where the lime and okra served as natural binders,

solidifying the material. Additionally, the kit also included a portable metal oven to bake the tools.

The outcome was a collection of molded artifacts functioning as cutlery and plates. This work exemplifies a situated approach to materiality and sustainability, integrating both the aesthetic and functional properties of sand into a cohesive design narrative.

Figure 20. Molded artifacts, stencils and prototype of the oven.

Figure 21. Molded artifacts and stencils.

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Figure 22. Molded artifacts and stencils.

Figure 23. Exhibition during the Design Week with all the final prototypes.

5. An Evolving Framework

Student projects completed over the semesters informed the development of an evolving methodological framework aimed at extending and strengthening the pedagogical foundation of the course. In this section, we introduce that framework, one that integrates student feedback, field observations, and the analytical research conducted at the conclusion of the courses.

The four directions outlined at the beginning of Chapter 4: (1) Environmental Probes; (2) Multisensory Experience; (3) Feeling and Sensing; and (4) Material Transformation—served as initial reference points. Observations and feedback were mapped and clustered to identify emerging themes. These clusters were then positioned within the framework as new liminal experiences, based on their thematic content and points of intersection with the original four directions. Each of the six proposed intersecting liminal experiences relates to a different way of knowing, feeling, interpreting and *designing-with* the environment.

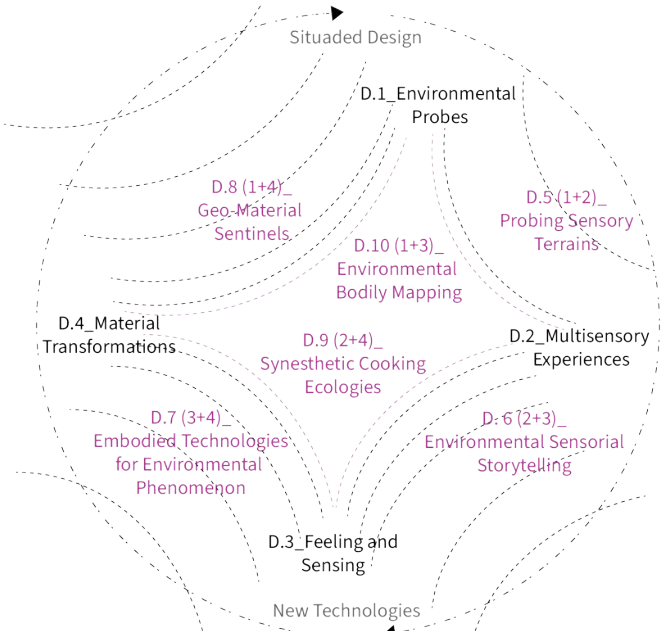

Figure 24. Four directions and six new intersections and proposed liminal experiences.

Direction 5: Probing Sensory Terrains
Direction 1 + Direction 2

This sub-trajectory explores the development of environmental sensory probes, that is, deployable devices that do not just collect environmental data but also evoke or measure sensorial experiences. For instance, how might light or taste perceptions shift in extreme environmental conditions such as sandstorms or intense heat? This could lead to the design of multisensory mapping tools tailored to cooking rituals, capable of monitoring how people feel, taste, or see during food preparation under changing environmental conditions. These tools might be seen as instruments that *sense-what-we-sense*.

Direction 6: Environmental Sensorial Storytelling
Direction 2 + Direction 3

This sub-trajectory investigates how sensorial perception may be altered by environmental phenomenon—such as spices intensifying in high temperatures, and how these changes could serve as narrative media. The environmental becomes a form of expression. For example, heat-reactive materials might shift in flavor or texture, giving rise to adaptive cooking surfaces that tell stories through transformation. These materials could enrich food preparation with embedded environmental cues and responses.

Direction 7: Embodied Technologies for Environmental Phenomenon
Direction 3 + Direction 4

Intersecting Directions 3 and 4 is about designing tools that translate environmental phenomenon into embodied, culturally-inflected experiences through the use of local materials. It explores how such phenomena shape not only food, but also memory, gesture, bodily forms, and spatial configurations. This could inform ritual-based cooking devices, echoing, as in the instance of previously presented designs, traditional Bedouin techniques. Continuing to take heath as an example, potential application might involve the design of cooking systems that reflect the sociality of warmth, activating specific behaviors or postures during food preparation.

Direction 8: Geo-Material Sentinels
Direction 1 + Direction 4

Intersecting Directions 1 and 4 brings together the impetus of environmental probes and that of material transformations. The focus here is ecological responsiveness through material decay or integration. This suggests opportunities for probes design involving the use of local resources (e.g. local sands, clays or organic waste) that transform together with the environment (merging, disappearing, or decomposing in it), while simultaneously collecting data. Probes act therefore as ecological indicators and opportunities for material studies at once.

Direction 9: Synesthetic Cooking Ecologies
Direction 2 + Direction 4

This sub-trajectory is about the creation of multisensory interfaces or materials that taste like or look like their environmental source. For example, exploration opportunities could involve the design of cooking tools infused with different plant's oils extracts that release flavor through heat. This might also open space for visual-taste experiments, where form, color, and flavor work together to communicate ecology.

Direction 10 Environmental Bodily Mapping
Direction 1 + Direction 3

This sub-trajectory investigates how environmental probes can be designed not only to collect external data, but also to translate natural phenomena—such as wind, humidity, salinity, or light—into bodily, perceptible experiences. It aims to connect measurable changes in the environment with the felt, lived experience of those changes, providing a bridge between sensing technologies and bodily perception. For example, probes might transmit environmental shifts through haptic feedback, thermal gradients, or kinetic movement, creating a form of embodied environmental cartography. These tools could be wearable or embedded in cooking objects, offering real-time sensory translations of atmospheric or geophysical conditions: tools that sense with us, extending our bodily understanding of the environment, rather than abstracting it.

These liminal experiences provide a generative scaffold for future iterations of the course, encouraging students to think with, through, and alongside environmental conditions during the design process.

6. Discussion

The course outlined in this paper sought to immerse second-year undergraduate design students in complex, interwoven concepts such as Situated Knowledge (Haraway, 1988), Ecosophy (Næss, 1973), and Multispecies theory (Kirksey & Helmreich, 2010; Ogden et al., 2013), engaging them in site-specific inquiries within an arid desert context. Through reflection on multiple course iterations—by both instructors and students—key insights emerged, as did productive frictions. These are not interpreted nor presented as shortcomings, but as generative conditions that inform future pedagogical development.

A primary strength of the methodology lay in its hands-on, inquiry-driven approach, which blended sensory ethnography, environmental mapping, and iterative prototyping. By working within a distinct ecological context, students were encouraged to engage with the interdependencies between material, cultural, and environmental dynamics. The emphasis on mapping and sensory research helped students to construct nuanced readings of place and inhabit its settings. However, the link between these mappings and the design outputs was at times

inconsistent, suggesting the need for deeper integration between spatial analysis and material articulation.

One of the course's most revealing tensions surfaced in the relationship between field research and design ideation. Several students expressed difficulty in decoupling preconceived notions of the desert—shaped by media or inherited imaginaries—from their lived, subjective site-specific experiences. This occasionally resulted in superficial, biased outputs. Likewise, students often blurred the lines between field research as an open-ended, observational act, and design as a generative, future-oriented practice. Upon reflection, withholding the explicit design brief until after the fieldwork phase may allow students to more deeply engage with the specificity of place without prematurely framing it as a problem that needs to be solved.

The pedagogical structure—where theoretical frameworks were introduced early and gradually enacted through embodied fieldwork—proved effective. The students' initial perception of the desert as a "scarce" or "empty" space—echoing both postcolonial framings of the desert as a 'non-place' and dominant ecological narratives of lack—gradually shifted over the course. Through multisensory and contextual encounters, students began understanding and recognizing the richness of desert ecologies, and the possibilities offered by a situated—as opposed to extractive, approach to design thinking. At the same time, the pedagogical framework also highlighted theoretical gaps. For instance, the desert environment, rich with animal, vegetal, and mineral agents, exposed students to more-than-human actors in ways that existing curricula had not fully anticipated. While students were encouraged to experiment with multispecies narratives and perspectives, many seemed to lack the expertise and conceptual tools to deeply engage with such ethnographic practices. Future iterations would benefit from a strengthened theoretical framing, where more-than-human design, biodesign, and ecocritical perspectives would be integrated not as supplements but as foundational tools.

Another key insight emerged in relation to fabrication and the evolving meaning of the Fab Lab. Rather than positioning the lab as a central, static site of production, the course proposed a distributed, multi-sited model of fabrication. Students were encouraged to reimagine making as a layered process. One that begins in the field, through sensory and material engagement, and culminates in iterative speculative prototypes. In this model, transformation is not confined to material manipulation but includes the translation of observations, bodily responses, and ecological rhythms into new design forms. The lab becomes here a relational node—one that connects local materials, environmental conditions, and cultural knowledge, enabling fabrication to expand across human and non-human registers. Seen this way, the lab is less a technical facility and more a porous epistemic milieu—an interface between the analytical and the affective, the mechanical and the relational. This expanded notion of fabrication, rooted in the idea of co-presence and becoming-with the environment, reflects a deeper commitment to working with, rather than simply upon, the world, particularly when confronting wicked environmental problems.

7. Conclusion

The design course outlined in this paper highlighted the importance of designing with the environment rather than for it, becoming a testing ground for an evolving pedagogical framework. As detailed in Chapter 5, this framework emerged through the interplay of theoretical inquiry, site-specific fieldwork, and iterative design practice. It was shaped not only by ecological and cultural conditions but also by the uncertainties, misalignments, and breakthroughs encountered across the course's multiple iterations.

Rather than prescribing fixed outcomes, the course invited students to embrace complexity, uncertainty, and relationality. In doing so, it repositioned design from a problem-solving, extraction-oriented practice to one of attunement, habitation, and co-presence. Situated knowledge, multispecies relationality, and ecosystemic thinking moved from abstract theory to embodied concern — reframing how students perceive environments, define problems, and prototype responses.

The evolving framework proposed here is inherently and purposefully unfinished. It adapts to the specificity of each site and cohort, and is shaped by ongoing experimentation, reflection, and critique. Its strength lies not in replicability, but in its generative potential — in the principles it helps articulate and expand: to design with, rather than for; to recognize environments and environmental entities as co-agents; to approach fabrication as relational and distributed; and to view the classroom as a worldly, porous, open, system.

Future iterations of this approach will benefit from a deeper integration of multispecies ethnography, critical posthumanism, and ecodesign — not as collateral, but as foundational design tools. By continuing to refine both its methods and its ethos, this framework aims to cultivate designers capable of working within — not outside — the complex, contested, and more-than-human realities of our time.

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ethical leadership
a new frontier for design

Co-creating everyday future foods with seaweed and insects

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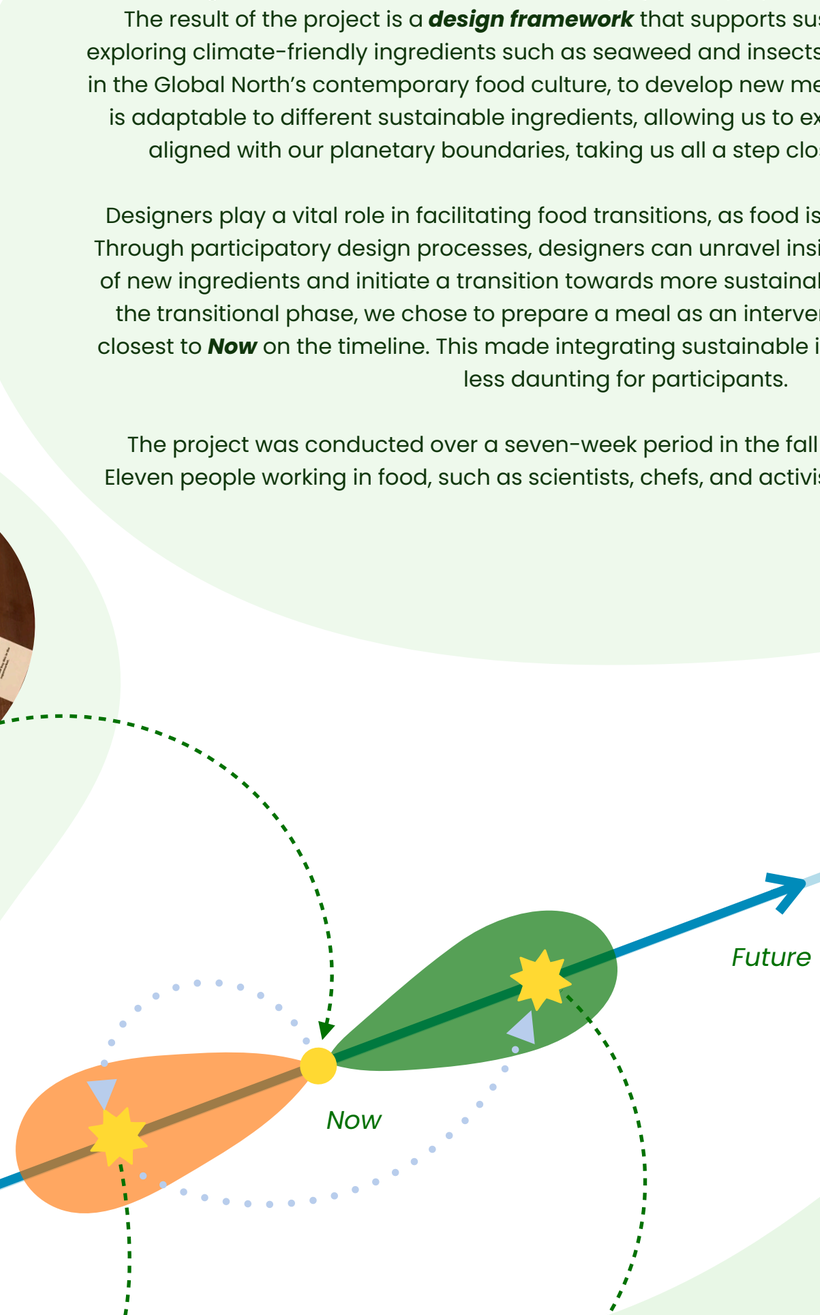
The focus of the project was to ***re-imagine eating insects and seaweed together with participants*** to encourage a sustainable food transition. The project employed a participatory design approach. The result of the project is a ***design framework*** that supports sustainable food transitions by exploring climate-friendly ingredients such as seaweed and insects, which are not commonly used in the Global North's contemporary food culture, to develop new meal ideas. The design framework is adaptable to different sustainable ingredients, allowing us to explore and create meals more aligned with our planetary boundaries, taking us all a step closer to the preferred future.

Designers play a vital role in facilitating food transitions, as food is deeply personal and cultural. Through participatory design processes, designers can unravel insights that support the adoption of new ingredients and initiate a transition towards more sustainable everyday foods. To support the transitional phase, we chose to prepare a meal as an intervention based on the prototype closest to ***Now*** on the timeline. This made integrating sustainable ingredients more relatable and less daunting for participants.

The project was conducted over a seven-week period in the fall of 2019 in Kolding, Denmark. Eleven people working in food, such as scientists, chefs, and activists, participated in the project.

1.

1:1 Dialogue Tool: A visual interview tool to guide conversations with statements and questions about food perceptions, supplemented with photos, to understand a baseline of the current perception of these ingredients.



Food as Medicine
personalised to your genes

Future Fast Food
full of nutrition and easy to eat

Near Future Thanksgiving
replacing meat with insects

3.

Future Food Prototyping: An activity to prototype preferred future foods, where seaweed and insects would be recognised as everyday ingredients.

Future Food Lab:
co-creation workshop

A sensory landscape to explore through smelling, touching, tasting, while discussing the ingredients, memories and associations.

A story shared with the participants from the future to set the stage for prototyping. Prototyping materials included ambiguous pictures and various craft materials.

2.

Sensory Landscape: An activity to explore a landscape of different smells, plates of food products with distinct appearances, tastes and mouthfeels with a focus on imagination and future thinking to share memories and associations. The sensory landscape included insects and seaweed as part of the food selection.

An easy and comforting meal, familiar in appearance to everyday food.

4.

Prepared Meal Intervention: An intervention in the form of a prepared meal as a result of the findings, intended as an example that is familiar, comforting, and convenient to make at home. A video was produced as part of the intervention as well.

Participant Reflections *"After the workshop, I got information about the benefits of seaweed and insects, got a chance to taste a different selection than I was used to, and learned how to harvest seaweed in Denmark. Since I am a vegetarian, I have not incorporated insects into my everyday diet. I have sometimes harvested seaweed myself. The most significant change is that I became comfortable harvesting seaweed from nature."*

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To see the videos and read more about the project, visit:
patriciacsobanczi.com/futurivore

Food Transition

Food Serenity and Environmental Challenges

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Design as a Strategy to Promote Community Food Circulation: A Case Study of Food System Design and Sustainable Community Renovation Strategies in Beijing Caochang Community.

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ABSTRACT | The urban community faces complex food challenges, including food waste, limited local supply, and low resident engagement. Traditional approaches, such as composting and waste sorting, often lack a systemic perspective. Research through Design (RtD) serves as an exploratory method that leverages design practices to generate insights and solutions, emphasizing innovation through cross-disciplinary collaboration. This paper employs RtD to integrate sustainable design into community transformation, optimizing resource utilization and encouraging cycles of reuse, thereby advancing sustainable development in urban neighborhoods. Taking Beijing Caochang community, a typical aging hutong community with notable issues of spatial degradation and underutilized resources, as a case study, this project aims to establish an edible, waste-free public landscape through participatory design. The proposed community food system is embedded within a broader ecological renewal strategy, tackling challenges from three perspectives: system optimization, spatial intervention, and organized participation. Through community-building activities, the project brings together residents, stakeholders, and professionals to form a collaborative model of co-creation. A final exhibition will serve to consolidate shared understanding, promote best practices, and enhance the

community's food security, health, and vibrancy.The application of RtD offers innovative approaches to addressing practical food system issues, while providing a structured and interdisciplinary reference for building urban food recycling systems. This method introduces a unique perspective for understanding and addressing the multifaceted food issues within urban communities, offering valuable insights and contributions to future research and practice in related fields.

KEYWORDS | SUSTAINABLE DESIGN,FOOD CIRCULATION,RESEARCH THROUGH DESIGN(RTD),LIFE CIRCLE,COMMUNITY REGENERATION

1. Introduction

The issue of food in urban communities has become a global challenge. Relevant studies indicate that food waste in urban areas spans the entire lifecycle of food, including production, consumption, and disposal (Ivert, L.K. et al., 2015). First, in the production phase, local food supply is insufficient, and urban communities are highly dependent on external sources. This reliance leads to increased food miles and reduces the self-sufficiency of communities (Liang et al., 2024). Secondly, During consumption, households often lack proper procurement and storage planning, leading to significant food waste (Roodhuyzen et al., 2017). This waste extends beyond households to the community level, resulting in substantial food discards during consumption (Peng et al., 2024). At the food disposal level, there is a lack of effective food recovery and reuse mechanisms in the community. This prevents proper disposal of discarded food, further exacerbating the problem of food waste and placing additional pressure on the environment (Garrone et al., 2024). Additionally, low community participation in food systems hinders solutions, as residents' attitudes and participation levels significantly impact their views on food waste and healthy eating (Farr-Wharton et al., 2014). This low level of participation cuts across all aspects of food production, consumption, handling and reuse, further compounding the complexity of the food problem.

As the capital of China and an international metropolis, Beijing community food system faces various challenges despite its role in meeting the basic needs of residents (Ma et al., 2020). In recent years, with the acceleration of urbanization and the improvement of residents' living standards, the complexity and diversity of Beijing community food systems have become increasingly prominent. (Ma et al., 2022). To address these challenges, some communities have begun to take action to promote food system optimization and change, such as establishing community gardens and promoting waste separation, but the overall effect still needs to be further improved. This study aims to explore strategies for embedding sustainable food systems into community ecological regeneration through the RTD methodology and the perspective of whole-life design. Through the design perspective and methodology, it provides new ideas and solutions for optimizing the food system in urban communities.

2. Research Methods and Perspectives

2.1. Research through Design

Research through Design (RTD) is a methodology that tightly integrates design practice with research (Frayling, 1993). The RTD methodology has been systematized by Frayling, C. and Findeli, A. et al. and is centered on design as a central means of research, where design activities are used to generate knowledge, explore problems and propose solutions (Findeli, 2004). Findeli advocates for project-led research, emphasizing participatory, action, and grounded theory approaches (2004,44-45). Other scholars highlight design practice as not only a research tool but also a driving force (Durrant et al., 2017). In this study, RTD is applied to construct a zero-waste edible system in Caochang Community. From the initial stage of the study, design was considered an

important research methodology throughout the research process. Cutting through the lens of design, design workshops were organized and community residents, neighborhood committees, and social organizations were invited to participate. These workshops are not only venues for design activities, but also an important part of the research. Through the process of co-creation with the residents, we gained a deeper understanding of their needs and behavioral patterns, which provided a basis for the planning of the edible no-waste system, and ensured that the implementation of the project could fully reflect the needs and wishes of the residents. This design-centered research approach not only improves the feasibility and acceptance of the project, but also enhances the residents' sense of belonging and responsibility, and promotes the sustainable development of the community.

2.2. Life Cycle Perspective

The concept of life cycle, initially introduced by the advertising firm Booz Allen Hamilton in 1957, is a systematic perspective for depicting the entire process of a product from inception to obsolescence. It follows a "cradle-to-grave" approach, emphasizing comprehensive management across production preparation, manufacturing, use, and disposal to minimize environmental impact and maximize resource efficiency (Zhang, 2013). With growing global attention to environmental protection and sustainable development, the life cycle perspective has been increasingly applied to food system studies (HUI, 2022), focusing on the entire process of food production, processing, transportation, consumption, and waste handling (Rosli et al., 2024). In this study, we apply a full life-cycle perspective to optimize the urban community food system, designing for every aspect of food processing, while delving into the public spaces of the community, focusing on how the dispersed and underutilized urban public spaces in the community can be transformed into sustainable full-cycle productive landscape spaces.

3. Survey on Sustainable Zero-Waste Living in Beijing Caochang Community

3.1. Site Background

The caochang Community in Dongcheng District, Beijing, boasts a rich historical and cultural heritage. Its distinctive location and spatial characteristics make it the only north-south-oriented hutong cluster in the city and one of the best-preserved traditional hutong districts. Bounded by Xixinglong Street to the north and Zhushikou East Street to the south, the community covers an area of approximately 0.32 square kilometers, comprising 25 hutong alleys and 616 traditional courtyard residences. Key community facilities include small convenience stores, an elderly service station, and a kindergarten, as illustrated in Figure 1.

Figure 1. caochang Community Floor Plan, Source: Author's own illustration

Additionally, the community has established the Xiaoyuan Deliberation Hall, a resident-led democratic discussion space, fostering a strong culture of grassroots self-governance and participatory decision-making. In recent years, with increasing attention and support from various stakeholders, the community has developed an innovative, exploratory governance model that integrates diverse interest groups, including government agencies (subdistrict and community committees), NGOs (local social work organizations), resident self-governance groups, and academic institutions. Community governance and placemaking initiatives have been implemented with a strong emphasis on low-carbon development and zero-waste principles, shaping a more sustainable and participatory urban renewal approach.

In 2021, with support from the subdistrict office and under the coordination of the local social work organization Sanzheng Social Work, the caochang Community incubated and nurtured a resident-led self-governance group, A2Z (Action to Zero Waste), dedicated to promoting a zero-waste lifestyle. This initiative introduced and advocated for sustainable waste management practices, helping the subdistrict address challenges related to waste classification at the source. A series of online and offline community activities centered around zero-waste living were launched, culminating in the establishment of Beijing first Zero-Waste Circular Courtyard, an innovative model that laid the foundation for sustainable environmental practices in traditional courtyard-based neighborhoods. Since 2022, the vision of Zero-Waste caochang has emerged as a shared objective among stakeholders, extending beyond waste classification enforcement to a broader

effort of embedding zero-waste principles into daily life. This initiative aligns with China's national ecological civilization strategy and carbon neutrality goals, positioning the community as a testing ground for sustainable urban practices. Against this backdrop, our team engaged with the caochang Community, integrating its zero-waste development objectives into our design practice. Through collaborative governance and innovative community-based interventions, this research aims to contribute to the sustainable transformation of the neighborhood.

3.2. Community Status Analysis

In the preliminary research, we classified the zero-waste behaviors of residents in the caochang Community and found that these behaviors were quite diverse. A significant number of residents had a strong interest in gardening and crop exchange, with kitchen waste making up a large portion of the community's waste categorized for sorting. Further analysis of residents' specific behaviors in waste sorting and kitchen waste composting revealed an interesting phenomenon: many residents tend to repurpose discarded materials such as metal, empty bottles, and wooden boards， as shown in Figure 2.

Figure 2. Residents' Spontaneous Gardening Behavior, Source: Photographed by the author.

These waste materials were often ingeniously used as containers for kitchen waste composting. This spontaneous initiative not only demonstrates strong environmental awareness but also fosters social interaction and collaboration among neighbors. Moreover, residents exhibit a high level of enthusiasm in gathering compostable materials, proactively collecting bones, fruit peels, food scraps, and eggshells for composting, thereby achieving a certain degree of self-sufficiency.Field research further reveals a negative correlation between residents' age and their acceptance and participation in sustainable practices. Specifically, older residents are more inclined to actively engage in zero-waste initiatives, assuming leadership roles in promoting sustainable living within the community, as illustrated in Figure 3.

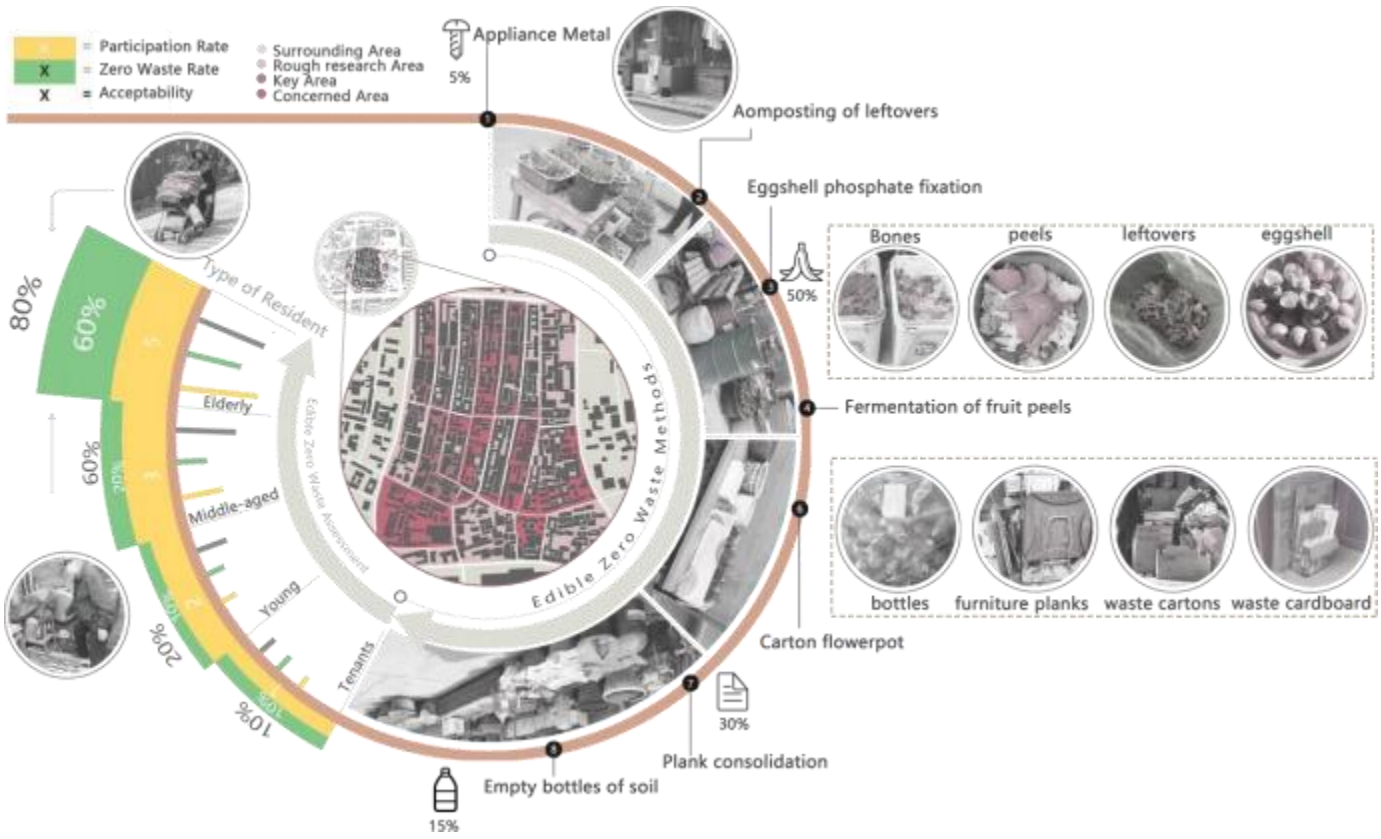

Figure 3. Research on the zero-waste living behavior of Caochang residents,Source: Author's own illustration

However, a comprehensive investigation of the caochang Community revealed significant spatial disparities in the adoption of sustainable living practices, despite the presence of numerous sustainability initiatives and organizations. The core areas of the community, particularly the hutongs surrounding the Xiaoyuan Deliberation Hall, exhibit a high level of engagement. In contrast, residents in the peripheral hutongs, further from the community center, demonstrate a comparatively vague understanding of or even indifference toward sustainable living concepts.This spatial disparity reflects imbalances in multiple dimensions, including residents' awareness, spatial planning, and incentive mechanisms. Residents in peripheral areas often lack both access to community activities and the motivation to participate, making sustained engagement difficult. The current situation in caochang Community may exemplify broader challenges faced by urban communities. As urbanization progresses, many neighborhoods may encounter similar difficulties, including effectively communicating the importance of sustainable living and identifying appropriate approaches to meet residents' needs while promoting sustainable lifestyles.

Given the prevalent challenges in urban communities, including food waste, insufficient local food supply, and low levels of resident engagement, this project adopts the Research Through Design (RTD) approach, using food circulation as a guiding principle to develop a low-carbon spatial framework for the caochang Community. By optimizing the community's food circulation system through a lifecycle perspective, the project aims to establish zero-waste public spaces and promote sustainable community development. The core concept of this project lies in the integration of co-creation mechanisms with food circulation, employing a systematic design approach to maximize resource efficiency and minimize waste, thereby enhancing both environmental sustainability and

social resilience.Shaping Resident Awareness – Through regular community workshops and the establishment of a harvest-sharing mechanism, the project fosters habitual green Environmental Optimization – Utilizing the RTD methodology, underutilized and abandoned public spaces are transformed into productive edible landscapes, improving the community's environmental health, comfort, and sustainability. Building a Community Co-Governance Mechanism – Residents are encouraged to actively participate in every stage of the project, from compost system construction and food cultivation to long-term circular management. This shift from passive acceptance to active governance strengthens residents' sense of belonging and social cohesion.Ultimately, the value of this project extends beyond the creation of an adaptive community ecosystem. It seeks to establish a scalable model for sustainable community development, providing replicable strategies for other urban communities in food resource circulation and system integration.

4. RTD in Beijing Caochang community: Building the Food Cycle

At the initial stage of the project, we conducted questionnaires, interviews, and field studies to gain an in-depth understanding of residents' needs, behavioral patterns, and awareness of low-carbon living. To foster community engagement, we organized multiple resident mobilization meetings to introduce the project's background, objectives, and significance. Through these sessions, we not only communicated the importance of low-carbon living but also gathered residents' preliminary perspectives on the community environment and sustainable development.In the "Food Cycle for Low-Carbon Space Creation" project in caochang Community, we adopted a Research Through Design (RTD) approach as the core methodology, integrating design practices throughout the entire project lifecycle.

4.1. Co-creation workshops and program design

We organized multiple design workshops, inviting community residents, neighborhood committee members, representatives of social organizations, and university teams to participate. These workshops served not only as platforms for design activities but also as essential components of the research process. Through group discussions, brainstorming sessions, and hands-on exercises, residents shared their ideas and suggestions on waste sorting, kitchen waste composting, and the utilization of public spaces within the community. During the workshops, residents proposed creative ways to repurpose discarded materials as composting containers—an initiative that was both environmentally friendly and instrumental in fostering social interactions and cooperation among neighbors, as shown in Figure 4.

Figure 4. Caochang Community Co-creation Workshop, Source: Photographed by the author.

This design approach emphasizes a shift from "designing for the community" to "designing with the community," valuing residents' knowledge and experiences while making them active participants in the design process. By engaging in these workshops, residents not only had the opportunity to express their needs and expectations but also played an active role in shaping the project. This participatory process significantly enhanced the feasibility and acceptance of the project.

Building on the workshops, we further organized resident pairing activities to encourage peer learning and collaboration, as shown in Figure 5.

Figure 5. resident pairing activities, Source: Photographed by the author.

Through teamwork, residents co-designed preliminary composting plans and vegetable garden layouts, reflecting their collective wisdom and providing valuable references for subsequent design iterations. The pairing activities deepened collaboration among residents, fostering knowledge sharing and skill development. Through continuous exploration and refinement in practice, the community cultivated an ongoing learning and innovation environment.This community-based cooperative model not only strengthened residents' sense of belonging and responsibility but also laid a solid foundation for the long-term sustainability of the project. Based on resident feedback and co-creation outcomes, we further refined the design plans, ensuring that they not only addressed the actual needs of the community but also integrated a lifecycle perspective to enhance the project's sustainability and practicality.

4.2. Community Food System Optimization

In Caochang Community, we systematically optimized the residents' food system from a lifecycle perspective, as illustrated in Figure 6. The process encompasses food acquisition, processing, and consumption, followed by the separation of organic and non-organic waste, composting of food waste, and vegetable cultivation, forming a tightly interconnected circular system.This lifecycle intervention not only addresses all stages of food production and consumption but also extends to waste repurposing and resource regeneration, ensuring that each phase aligns with the principles of sustainable development.

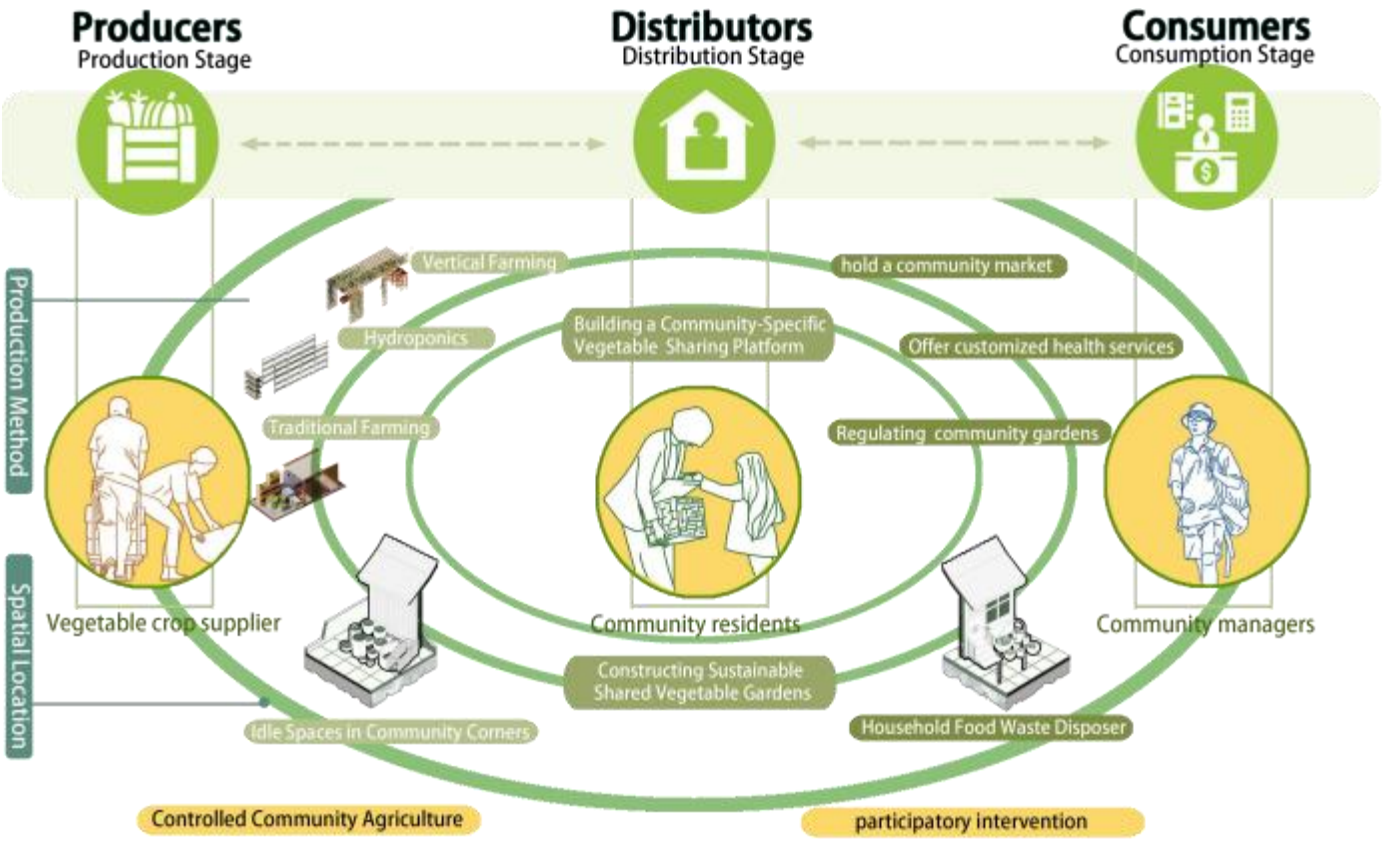

Figure 6. Optimization of Community Food Systems, Source: *Author's own illustration.*

First, we transformed underutilized public spaces that connect different hutongs within the community into shared vegetable gardens for residents. By redefining residents as food distributors, we encouraged a shift from isolated courtyard composting to open, shared composting systems. Through hands-on learning, residents were taught various self-sustaining cultivation techniques and food waste management methods, enabling them to compost effectively and reduce environmental pollution.
We employed diverse spatial planting strategies to cultivate edible, organic green vegetables, integrating residents into the local food distribution network while promoting sustainable urban agriculture.

At the food distribution stage, we established an exclusive community-sharing platform to promote the development of sustainable shared gardens. Residents are encouraged to actively participate in the construction and management of community gardens, gaining firsthand experience in plant cultivation and engaging in vegetable gardening to appreciate the joy of agriculture.Additionally, the community regularly hosts local farmers' markets, enabling residents to exchange fresh, healthy produce. This initiative not only fosters community engagement but also reduces energy consumption and carbon emissions associated with long-distance food transportation.

In the consumption segment, the supervision and management of community shared gardens will be strengthened through community managers running community mini-bazaars, while community activities will be organized on a regular basis to enhance exchanges and cooperation among residents and promote the harmonious development of the community. Residents are encouraged to actively participate in environmental protection and resource recycling in the community, and to develop good habits of waste classification and composting.

4.3 Zero-Waste Interventions in Public Spaces

To establish a new edible low-carbon circular system in caochang Community, we proposed the integration of participatory edible public landscapes, seamlessly linking kitchen waste management with residents' daily lives. This approach aims to foster community self-governance, promote healthier lifestyles, and develop a sustainable management model.We designed diverse plant distributions within public spaces, selecting species that combine environmental adaptability, aesthetic value, and practical use. Residents are encouraged to participate in planting and maintenance based on their interests and expertise, strengthening their sense of stewardship and appreciation for the community environment.

Additionally, we repurposed discarded foam boxes, plastic barrels, and other materials to create multi-functional sustainable planting containers in public spaces, integrating composting, cultivation, and environmental education. These planting units serve as both practical gardening tools and educational platforms, equipping residents with gardening skills and environmental awareness.The participatory edible public landscape is envisioned as the core of the community food system, incorporating ecological planting, kitchen waste processing, and social engagement. By growing and harvesting edible plants, residents can experience the full farm-to-table cycle, fostering a closer connection to nature and active participation in sustainability initiatives.

4.4. Community Organization Operation Strategy

In advancing community self-governance, we place particular emphasis on deep engagement from residents and diverse stakeholders. To facilitate this, we propose the establishment of a community management body or committee, creating a collaborative platform where residents, neighborhood committees, A2Z, and other organizations can jointly participate in decision-making and management of the community food system. This framework aims to ensure the efficient operation and long-term sustainability of the community food system, as illustrated in Figure 7.

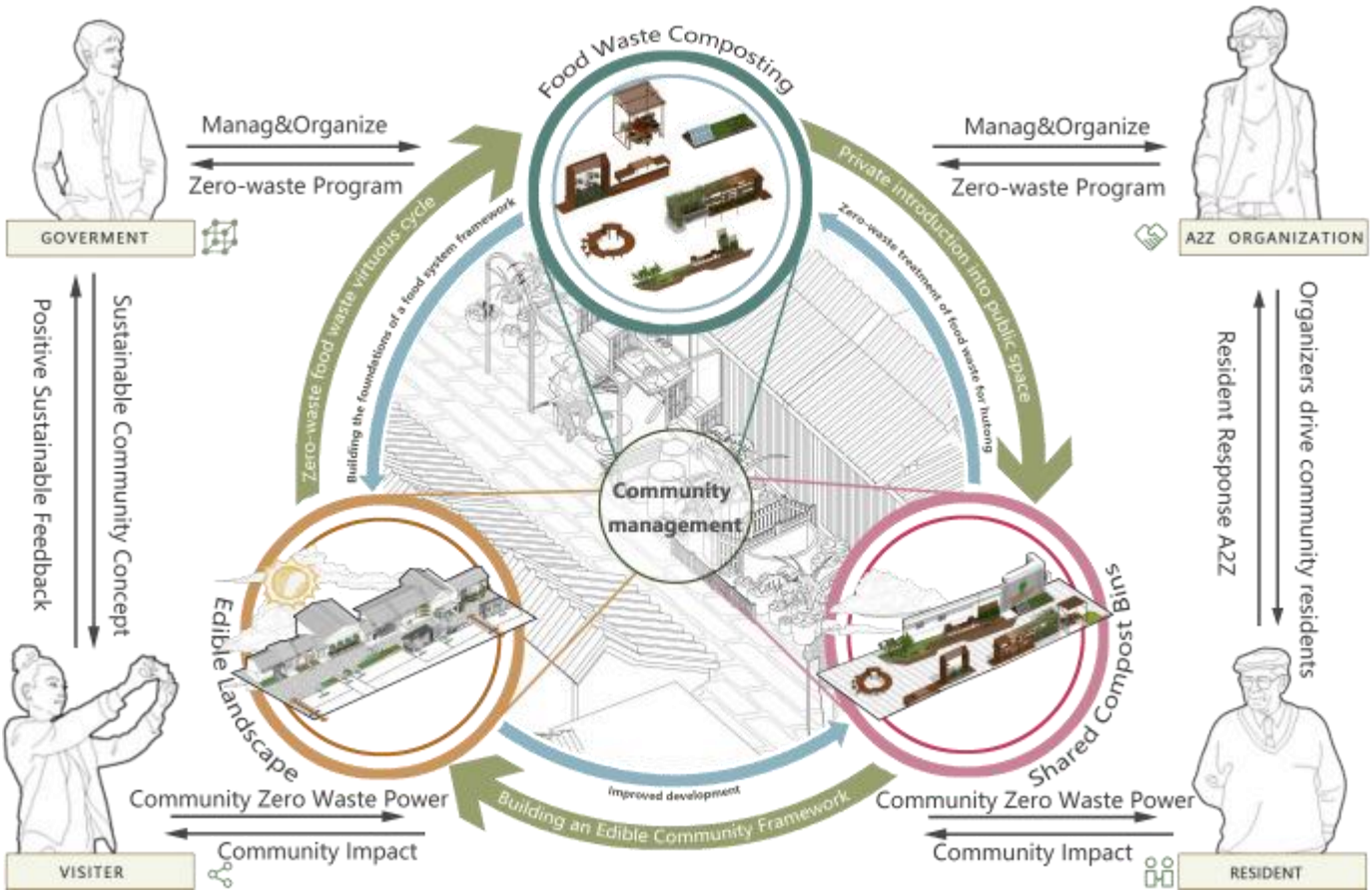

Figure 7. Optimization of Community Food Systems, Source: *Author's own illustration.*

We proposed the establishment of community management institutions or committees to facilitate joint decision-making and governance of the community food system by residents, neighborhood committees, A2Z, and other stakeholders. In this framework, the neighborhood committee and A2Z would serve as the primary organizers and implementers, coordinating resources and driving initiatives to ensure the effective operation and long-term sustainability of the food system.

Their key responsibilities would include organizing community activities and educational seminars to enhance residents' environmental awareness and practical skills, thereby encouraging active participation in zero-waste kitchen waste composting practices. Through increasing resident engagement, the initiative aims to cultivate a sense of autonomy in the maintenance and evolution of the community food system. By embedding sustainability principles into daily life, residents would progressively take

ownership of the system's development, contributing to the broader goal of sustainable community transformation.

Within this strategic framework, we anticipated that the development of the community food system will generate both social and environmental benefits. We aimed to enhance the community's public vitality by involving tourists as participants, gradually transforming Caochang Community into a unique space integrating local life and environmental education functions. Visitors would not only have the opportunity to experience authentic community cuisine but also immerse themselves in sustainability practices, fostering a deeper understanding of environmental conservation and sustainable development principles.

This community-tourist interaction not only supports the long-term sustainability of the community but also serves as a platform for disseminating environmental awareness, establishing a positive feedback loop for sustainable practices. Caocang Community aspires to become a model for urban sustainability, demonstrating how local lifestyles can be harmonized with broader environmental goals.

Ultimately, through collaborative efforts in community self-governance, we aim to extend sustainability principles from the community level to the broader urban landscape. The community food system would not only provide residents with access to fresh and healthy food but also function as a living demonstration of environmental responsibility and sustainable living, contributing to the advancement of urban sustainability initiatives.

4.5. Community Public Space Transformation

Based on the planning of the scheme strategy, we designed three locations in Caochang Community, corresponding to the exchange space area, the shared collection area, and the popular science display area.

The exchange space area corresponds to the public space in front of the Caochang Kindergarten. Considering the daily activities of children and the waiting area for parents to pick up and drop off, the vegetable planting area is relatively small. The design sets up market selling areas and planting areas that match the height of children. Kindergarten teachers can integrate sustainability into daily teaching, instilling sustainable concepts into students from a young age, as shown in Figure 8.

Figure 8. exchange space area rendering, Source: *Author's own illustration.*

The shared market area corresponds to the public space in front of the elderly care station, serving as the location for the community convenience kitchen and small canteen. It completes a series of activities for the shared kitchen. The entire process is open and shared. Residents can experience the most sustainable circulation method of pre-meal and post-meal kitchen waste treatment and apply it to their family dining, as shown in Figure 9.

Figure 9. shared market area rendering, Source: *Author's own illustration.*

The education and demonstration areas are strategically distributed across underutilized public spaces within the community, which have been replanned and repurposed to serve as key showcases for the community's sustainable development initiatives. These spaces now function as important educational hubs, enhancing public awareness and engagement in environmental sustainability, as shown in Figure 10.

Figure 10. education and demonstration areas rendering, Source: *Author's own illustration.*

4.6. Community Building and Outcome Promotion

In the course of the project, we held regular composting workshops, inviting experts in the field of environmental protection to explain the principles and methods of composting to community residents, and instructing them on how to convert food waste into organic fertilizer. Through these workshops, residents not only acquired practical environmental skills, but also strengthened their sense of identification with the sustainable development of the community. Such practical activities not only raised residents' awareness of environmental protection, but also promoted communication and cooperation among neighbors, forming a good atmosphere of community interaction.

At the same time, we organized community staff and volunteers to visit the compounds in the community, to deeply understand the needs and feedback of residents in the process of project implementation, and to solve the problems encountered by residents in a timely manner. Through the visits, we actively publicize the concept of sustainability and encourage more residents to come out from the compounds and participate in the sustainable development of the community. This face-to-face communication not only brought the community staff closer to the residents, but also increased the residents' participation and satisfaction with the project.

After the completion of the design proposal, we organized a design exhibition to showcase the design concept, implementation process and results of the project, as shown in Figure 11.Community residents, community managers and representatives of social organizations were also invited to view the exhibition and discuss the project. Through the exhibition, residents were able to visualize the design scheme and put forward their opinions and suggestions. This way of design exhibition not only promotes communication between residents and designers, but also further optimizes the design scheme. Based on the resident s' feedback, we optimized and adjusted the design to ensure that it better suited the actual needs of the community. This process not only increased the participation of the residents, but also strengthened their sense of identity and belonging to the project, and deepened the awareness of the community's food issues and the construction of a zero-waste community. It also attracted the attention of the community and visitors. Through the exhibitions, we have not only raised the profile of the community, but also further promoted sustainable lifestyles and created a favorable social atmosphere for the sustainable development of the community. These exhibitions not only showcase the efforts and achievements of the community, but also stimulate the interest and participation of more residents and visitors in sustainable lifestyles.

Figure 11. scene at the exhibition, Source: *Author's own illustration.*

5. Conclusions

This study investigates how design-driven approaches can enhance community food circulation and promote sustainable urban regeneration. Through the integration of Research through Design (RTD) and a life-cycle perspective, the project develops a systematic framework that connects food production, consumption, waste management, and spatial transformation within the Caochang Community. Rather than treating food-related issues as isolated problems, this research demonstrates that embedding food circulation into participatory design processes can effectively activate underutilized spaces, strengthen community engagement, and foster a localized circular food system. The findings highlight the potential of design as both a methodological tool and a strategic intervention in addressing complex socio-environmental challenges in urban communities.

5.1. RTD and Life Cycle Perspective Provide a Practical Framework for Community Renewal

The combination of RTD and the whole life cycle perspective provides a new solution for optimizing the community food system. Through design practice and resident co-creation activities, RTD is able to tap into the actual needs and behavioral patterns of community residents, so that the design solutions can accurately meet the needs of community development, and significantly increase the degree of resident participation and the sustainability of project implementation. In the Caochang community, we encourage residents to participate in all phases of the project through design workshops, resident group pairing activities and design exhibitions. In the Caochang community, we encourage residents to participate in all stages of the project through design workshops, resident group pairing activities and design exhibitions, transforming residents from passive recipients to active participants. This participatory design not only enhances the feasibility and acceptance of the project, but also strengthens the cohesion of the community and the residents' sense of belonging through design practice. RTD has demonstrated its strong social mobilization ability in this process, embedding the concept of sustainability into the daily life of the community through design activities, and promoting the deep integration of community autonomy and ecological civilization.

5.2 Necessity of Resident Participation and System Optimization in Community Renewal

In the process of urban community renewal, the whole life cycle perspective provides an important theoretical framework and practical path for system optimization and sustainable development. The whole life cycle perspective emphasizes the complete chain from the production and consumption of resources to the disposal of waste, and integrates all aspects of community renewal into a unified system to ensure the efficient use of resources and minimize environmental impacts. The design practice of Beijing Caochang community connects food production, consumption, and waste disposal into a closed-loop system through a whole-life perspective. This systematic design approach not only optimizes the physical space of the community, but also reshapes the social

structure and cultural identity of the community through the design practice, and enhances the residents' awareness of and participation in sustainable lifestyles. The application of the whole life cycle perspective not only provides a new perspective for community renewal, but also provides a systematic optimization model for other urban communities.

5.3 Limitations of the Study and Future Outlook

Despite achieving significant results in Caochang Community, this study still has some limitations. Firstly, the research sample scope is limited to Caochang Community, and the universality of the conclusions needs further validation. Secondly, the research time span is relatively short, and the long-term effects and sustainability of the project require further observation and evaluation. Additionally, the study lacks quantitative assessment of resident participation, and future research needs to further refine the evaluation index system to more accurately measure resident participation and project effectiveness. Future research can expand the sample scope to apply RTD to more urban communities to verify its universality and effectiveness. The research can also extend the observation period to assess the long-term effects and sustainability of the project. Furthermore, future research can refine the evaluation index system for resident participation to provide a more scientific basis for optimizing community food systems.

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Design for ethical food choices: analyzing the opportunities and challenges of smartphone applications in promoting sustainable consumer behavior.

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ABSTRACT | In recent years, there has been growing awareness of the ethical implications of food choices, particularly regarding sustainability, environmental impact, animal welfare and health (Benthem de Grave et al., 2024). Despite many consumers expressing a desire to align their eating habits with ethical values, they struggle to make informed and consistent food choices. Factors like socioeconomic constraints, product availability, personal preferences, and the complexity of the food system itself often result in compromises that deviate from ideal decisions (Agyemang et al., 2024).
Digital technology, particularly smartphone applications, has emerged as a powerful tool to support individuals in navigating these challenges. They offer users instant access to information about the ethical implications of their food choices, and provide real-time data on product sourcing, nutritional content, environmental impact, and other considerations, allowing users to make more informed decisions in line with their ethical priorities. While apps designed for health-related diet tracking have garnered significant attention and adoption, those focused on broader ethical aspects of food choices are still in the early stages of development (Haas et al., 2022). There is a growing need to explore how these apps are designed, how effectively they address consumer needs, and what opportunities and challenges exist in their widespread adoption.
This paper aims at bridging this gap by examining the design characteristics of the most popular food purchase apps, and offering an in-depth analysis of the opportunities and challenges they present for effective implementation. The study contributes to a broader understanding of how digital technologies can be leveraged to promote ethical food purchasing and consuming behaviors and is preparatory to define the aesthetic, typological and functional characteristics of new products aimed at supporting ethical

food consumption behaviors. The methodology used in this research combines both quantitative and qualitative approaches by applying the Mobile App Rating Scale (Mauch et al., 2015). First, the most downloaded and higher rated mobile applications related to food purchasing will be identified: will be included those apps written in English, subscription free and with a high user rating. These apps will be then coded to capture their design characteristics, by using the four domains of the above-mentioned MARS scale: engagement, functionality, aesthetics, and information.
The findings aim to evaluate design characteristics of mobile applications and how they influence food purchase behaviors. Aspects under analysis will be the presence of customized recommendations, gamification, real-time feedback, integrated learning modules, and also the quality of interfaces, contents, navigability and all features useful to engage users effectively, and to maintain long-term user engagement – that today remain a big challenge as many users abandon apps shortly after download if they do not see immediate results (Moiz Riaz et al., 2023). Based on the findings, the paper will provide recommendations and design strategies for food purchase technological artifacts. Design choices will be demonstrated to be essential in ensuring that the app's core features are easily accessible, in optimizing the learning process, in motivating users to engage with the app through personalized contents and integrated long-term strategies.

KEYWORDS | UX DESIGN, FOOD PURCHASING AND CONSUMPTION HABITS, ETHICAL DESIGN, SUSTAINABILITY, MOBILE APPS

1. Introduction

In an era where global food systems face mounting challenges, including climate change, resource depletion, and rising health concerns, the promotion of the ethical implications of food consumption choices, particularly regarding sustainability, environmental impact, animal welfare, and health has become a critical priority (Willett et al., 2019). The global urgency to address unsustainable consumption patterns, indeed, is underscored by alarming statistics. According to the World Health Organization (2024), unhealthy diets contribute to six of the top ten global risk factors for disease. Moreover, food systems are responsible for approximately one-third of anthropogenic greenhouse gas emissions and significant shares of freshwater use and land occupation (Aleksandrowicz et al., 2016; Crippa et al., 2021). Consumers are more and more aware of this critical scenario, but they often face challenges in making informed and consistent choices, despite expressing a desire to align their food purchasing and consumption habits with ethical values. Socioeconomic limitations, product availability, personal preferences, and the complexity of the food system frequently led to compromises that deviate from their ideal decisions (Agyemang et al., 2024).
In this scenario, digital technology has become a powerful tool to help individuals navigate food consumption challenges, utilizing various solutions such as wearable devices, online platforms, social networks, and data-driven recommendation systems, with mobile applications playing a particularly important role. The range of mobile apps addressing eating habits and food choices has grown considerably in the last decades (Hingle & Patrick 2016), offering diverse functions tailored to different objectives. The specific focus and functionality of these apps have played a key role in shaping their success and adoption, with apps addressing personal health and fitness goals gaining widespread popularity, while

those tackling broader ethical concerns, such as sustainability and fair trade, have seen slower uptake (Haas et al., 2022). This highlights a growing need to examine how these apps are designed, what opportunities and challenges they face in achieving broader adoption and how effectively they meet consumer needs. Mobile apps, for instance, can offer users instant access to information about the sustainable practices and consequences of their food choices and provide real-time data on product sourcing, nutritional content, environmental impact, and other considerations, bridging the gap between knowledge and action and equipping users with tools to make informed decisions that align with environmental and ethical considerations (Mauch et al., 2018).

Furthermore, the significance of mobile apps in advancing sustainable consumption is supported by an increasing body of research. For instance, a study on the *MySusCof* app highlights its effectiveness in reducing food waste through user engagement and personalized recommendations (Haas et al., 2022). The app's design incorporates behavioral nudges, gamification, and insights to encourage users to adopt waste-reducing habits. Similarly, a review of food-related apps conducted by a group of researchers from the Newcastle upon Tyne University (United Kingdom) underscores the potential of these tools to support ethical decision-making by offering transparency about food sourcing, environmental impacts, and nutritional values (Benthem de Grave et al., 2024). Sustainability in food systems is not solely about reducing waste but also about fostering dietary shifts toward more environmentally friendly and health-promoting options. The *DISH - Dashboard for Improving Sustainable & Health food choices* app, described in an article written by a group of researchers from the University of Arkansas (USA) exemplifies this approach. It provides users with metrics that quantify the health and environmental impacts of their meal choices. By combining data on disability-adjusted life years (DALYs) and environmental footprints, DISH empowers users to make choices that extend beyond personal health to include societal and ecological well-being (Agyemang et al., 2024). Behavioral science plays a pivotal role in the efficacy of these apps. Techniques such as gamification, social comparisons, and feedback mechanisms have proven successful in altering consumer behavior (Dhahak & Huseynov, 2020). For instance, DISH's use of "EnCoins" – a virtual currency earned or lost based on the sustainability of food choices – encourages users to compete and collaborate within social groups, enhancing engagement and accountability. Furthermore, the integration of traffic light labeling systems, as demonstrated in apps like MySusCof and DISH, simplifies complex information into intuitive cues, making sustainable choices more accessible.

These few examples demonstrate that mobile apps act as catalysts for systemic change, fostering demand for sustainable products and practices across the supply chain. However, despite their potential, food-related apps face challenges that must be addressed to maximize their impact. Issues such as low user engagement, lack of integration with broader sustainability metrics, and limited accessibility for diverse populations highlight the need for continuous innovation and refinement.

The food transition thus emerges as a systemic priority that requires the mobilization of both individual and collective behaviors, technologies, and design practices. It is not simply about changing personal habits and food production, but about rethinking how food is distributed, and communicated. Within this framework, it's possible to address "food serenity" as a design goal to the pursuit of a new ethic and equilibrium between health, sustainability, and

pleasure, so placing the well-being of both humans and ecosystems at the core of the design agenda. Designers, in this context, are called to operate within a hybrid and increasingly political space: designing for food is not just about solving technical problems or creating pleasing user interfaces, but about shaping behaviors and values. Compared to other sectors, food-related apps respond to specific needs: they must address deeply rooted cultural habits, the emotional significance of eating, the complexity of supply chains, and users' struggle to access trustworthy information. Designing such applications means acknowledging that each interaction can become an opportunity to support informed, responsible, and ethical choices.
This study aims to examine the design features of the most popular food purchase apps and provide a comprehensive analysis of the opportunities and challenges they present for effective implementation. The research was conducted by the authors between November 2024 and February 2025. The methodology combines quantitative and qualitative evaluation criteria, relying on the Mobile App Rating Scale (MARS) (Stoyanov et al., 2015) to assess the applications in terms of engagement, functionality, aesthetics, and information quality.
The goal is to enhance the understanding of how mobile technologies can be leveraged to encourage ethical food purchasing and consumption behaviors, offering insights that may inform the aesthetic, typological, and functional development of future tools designed to support food transition efforts. This research is preparatory to the design of new digital products that do not merely assist but actively transform food-related decision-making.

2. Ethical practices in design food consumption mobile apps

From a design perspective, ethical food consumption is a goal that can be achieved through different approaches and strategies that address the environmental, social and health dimensions of food systems. Designers interpret ethical practices as a framework to create products and services that are accessible, engaging, beneficial, respectful of the users and the society (FasterCapital, 2022), and in the food consumption scenario this has implied developing tools and strategies for promoting transparency in food production, reducing waste, and advocating for equitable labor practices (Sanchez-García et al., 2024).
Mobile apps design translates these actions into features by integrating data visualization, personalized recommendations, and gamification (Minh et al., 2023). For instance, traffic light systems simplify complex sustainability metrics into intuitive visual cues, guiding users toward healthier and more sustainable options. Similarly, gamified elements such as reward systems encourage positive behavior changes by creating a sense of achievement and community engagement (Agyemang et al., 2024).
Mobile applications designed to promote ethical and sustainable food consumption can be classified according to their core objectives and the social impacts they aim to achieve. Broadly, these apps can aim at one or more of the following purposes:

- *Education*: These apps can focus on raising awareness and educating users about the environmental, social, and health implications of their food choices. Examples can include apps that provide information on carbon footprints, water usage, and fair-trade practices. The above mentioned MySusCof app exemplifies this category by integrating educational content with practical tools to reduce food waste. Such apps often target

individual behavior change by equipping users with knowledge to make informed decisions.

- *Behavioral Change*: Apps pursuing this goal leverage behavioral science principles to encourage sustainable practices. Features like gamification, social comparisons, and rewards are common. For instance, DISH app uses EnCoins and traffic light systems to nudge users toward healthier and more sustainable choices. These apps can create long-term habits by making sustainable behaviors enjoyable and rewarding.
- *Transparency and Accountability:* Transparency apps can provide detailed information about the sourcing, production, and environmental impact of food products. They empower consumers to hold companies accountable for their practices. Examples include apps that scan product barcodes to reveal supply chain data or calculate the ecological footprint of specific items. By promoting transparency, these tools contribute to broader systemic changes in food production and distribution.
- *Community Engagement*: Apps can focus on building communities around sustainable consumption. By enabling users to share their experiences, track collective progress, and engage in friendly competition, they foster a sense of collective responsibility. The social features of DISH, which allow groups to monitor their sustainability performance, highlight the potential of community-based approaches to amplify individual efforts.
- *Decision Support*: Apps can provide comprehensive decision-making support. Again DISH, for example, combines health metrics with environmental indicators to offer a nuanced understanding of food choices. By addressing multiple dimensions of sustainability, these tools cater to users with diverse priorities and motivations.

Apart from the general objectives that drive the primary user decision to download them, the effectiveness and impact of these apps varies importantly based on their design features and on their ability to engage users and integrate seamlessly into daily life. Features such as intuitive interfaces, graphic choices, real-time feedback, and culturally relevant content enhance user experience and adoption. Additionally, collaborations with stakeholders – including governments, non-profits, and private sector entities – can expand the reach and impact of these tools. For instance, partnerships with retailers and food producers can facilitate the integration of app functionalities into shopping experiences, further bridging the gap between knowledge and action.
In the following sections a selection of mobile applications aimed at pursuing ethical and sustainable food purchase and consumption goals will be examined in order to evaluate qualitative aspects such as purposes, design characteristics and how they influence food purchase behaviors. Qualities under analysis will be related with engagement, functionality, aesthetics and purpose (Mauch et al., 2018), such as the presence of customized recommendations, gamification, real-time feedback, integrated learning modules, and also the quality of interfaces, contents, navigability and all features useful to engage users effectively, and to maintain long-term user engagement – that today remain a big challenge as many users abandon apps shortly after download if they do not see immediate results (Moiz Riaz et al., 2023). By categorizing these apps based on their effectiveness, it's possible to gain a deeper understanding of their roles in promoting ethical and sustainable food consumption. As technology continues to evolve, these tools will play an increasingly critical role in shaping a more sustainable and equitable future.

3. Methodology of selection and analysis

The methodology followed for selecting and analyzing mobile applications designed to encourage sustainable food purchasing and consumption behavior has incorporated both quantitative and qualitative criteria.
The selection has involved stringent quantitative filters such as: apps have to be downloadable for free, available in English, have more than 5.000 downloads, a user rating of at least 3.5 out of 5, and be accessible on both Google Play and App Store. Quantitative filters such as download counts and user ratings will be consequently considered further parameters for understanding the impact, the popularity, the satisfaction and the overall adoption rate of the selected applications. Additionally, selected mobile applications must fall within the "Health & Fitness," "Lifestyle," or "Food & Drink" categories. Qualitatively, the apps must explicitly target at least one of the above described purposes: education (providing users with information about sustainable food practices, such as the environmental impact of food choices or nutritional benefits), behavioral change (encouraging users to adopt new, more sustainable consumption habits through tailored interventions), transparency and accountability (offering clear and reliable data on food sourcing, environmental impact, and ethical considerations), community engagement (creating a sense of collective effort by connecting users to communities with shared goals, decision support (assisting users in making informed and ethical food choices through tools like product comparisons or personalized recommendations).
The analysis tool used for outlining the main features of the selected apps has been the *Mobile App Rating Scale* (MARS), an app quality rating tool originally applied for assessing the quality of health mobile apps. The MARS tool provides a comprehensive framework for the evaluation of mobile applications, ensuring a structured and multidimensional analysis of their effectiveness, based on indicators of engagement, functionality, aesthetics, information quality and subjective quality. The integration of the MARS framework with the outlined qualitative objectives provides a holistic approach to evaluating mobile applications aimed at promoting sustainable food consumption. The section “engagement” refers to the app’s ability to captivate and retain user interest through interactive and motivational features. Key aspects include customization, gamification, real-time feedback. “Functionality” evaluates the technical performance of the app, focusing on its usability, reliability, and ease of navigation. “Aesthetics” assesses the visual and design quality of the app. An appealing interface can enhance user satisfaction and encourage sustained engagement. Key components include visual appeal, layout and visual identity of the app. “Information” is a critical parameter, evaluating the quality, accuracy, relevance, and reliability of the content provided by the app. A detailed description of the mentioned components for each quality domain will be provided in the next paragraph.
By hybridizing these parameters with the above-described purposes, the methodology ensures that selected apps not only meet technical and design standards but also effectively influence user knowledge, behaviors and decisions. This dual focus on evaluation criteria and qualitative objectives enhances the potential for these digital tools to drive meaningful change in consumer habits, contributing to broader sustainability goals. Engagement, for instance, ties directly to the qualitative objective of community engagement, as features like

forums, social media integration, or shared goals foster a sense of collective action. Apps with strong engagement strategies are better positioned to motivate users toward sustainable practices and retain them over the long term. The functionality of an app, on the other hand, is closely linked to the qualitative objective of decision support. Reliable tools for searching, filtering, and comparing food products enable users to make informed, ethical choices efficiently. A functional app removes technical barriers, allowing users to focus on their sustainability goals. The aesthetics of an app can indirectly support all five qualitative objectives by creating an environment that feels professional, engaging, and aligned with the app's ethical mission. Apps with robust information strategies, furthermore, directly support the qualitative objectives of education and transparency and accountability. For instance, an app that educates users about the carbon footprint of various food items and provides actionable recommendations enhances both user knowledge and trust.

4. MARS analysis sheet

This section explores in detail the parameters of the MARS framework applied to the selected mobile applications, emphasizing their relevance in assessing the quality of the apps and their broader potential to influence consumer habits.
The Mobile App Rating Scale (MARS) is a tool designed by a group of researchers from the Queensland University of Technology (Australia) to evaluate the quality of mobile health applications systematically (Stoyanov et al. 2015). The tool employs a five-point scoring system, where higher scores indicate better quality, thus providing a nuanced view of app performance. This multidimensional approach enables a more comprehensive evaluation than traditional single-factor rating systems, which may overlook critical aspects of user experience and app effectiveness (Mandracchia et al., 2020).
MARS framework can effectively differentiate between apps based on their quality metrics, revealing significant variations in user engagement and functionality among similar applications (Siddique et al., 2019). Therefore, employing the MARS scale, the analysis of the case studies, provided in the next section, not only assessed the technical aspects of the apps but also considered the user experience, thereby providing a comprehensive evaluation of their potential effectiveness in promoting sustainable consumer behavior.
Its four objective subscales focus on critical quality dimensions: Engagement, Functionality, Aesthetics, and Information Quality, while a fifth section captures Subjective Quality, reflecting personal impressions.
The section "engagement" measures how well the app engages its users. Engagement reflects the app's ability to attract and retain attention through qualities such as:

- *Entertainment*: Evaluates how enjoyable the app is, including the presence of gamification or other engaging features.
- *Interest*: Focuses on the app's ability to captivate users with compelling and well-presented content.
- *Customization*: Assesses the extent to which users can personalize app settings to their preferences.
- *Interactivity*: Rates features such as reminders, notifications, and feedback options, ensuring they are user-friendly and not overwhelming.
- *Target Group*: Evaluates the appropriateness of the app's design, language, and content

for its intended audience.

"Functionality" is a foundational section of app quality, as technical flaws or complicated navigation can compromise the app's effectiveness. Included parameters are:

- *Performance*: Measures the app's responsiveness and technical reliability, including the presence of bugs or crashes.
- *Ease of Use*: Assesses how intuitive and user-friendly the app is, including the clarity of instructions and menu design.
- *Navigation*: Evaluates the logic and flow of screen transitions, as well as the availability of essential links.
- *Gestural Design*: Examines the consistency and intuitiveness of gestures like taps, swipes, and scrolls across the app.

The section "aesthetics" focuses on the app's visual design. Aesthetics are crucial for creating a positive first impression and enhancing the user experience, especially for health apps aiming to engage users consistently. Analysed parameters are:

- *Layout*: Evaluates the organization of buttons, menus, and content on the screen for clarity and usability.
- *Graphics*: Assesses the quality, resolution, and consistency of visual elements.
- *Visual Appeal*: Rates the app's overall attractiveness, including the effective use of colors and stylistic elements.

The section "information" assesses the quality, accuracy, and credibility of the app's content. For these kinds of apps, high-quality information is essential to ensure users receive reliable and relevant guidance, which can impact their health outcomes. This section assesses parameters such as:

- *Accuracy of App Description*: Checks whether the app's features align with its store description.
- *Goals*: Evaluates the app's ability to set clear, measurable, and achievable objectives.
- *Quality of Information*: Rates the correctness, coherence, and relevance of the app's content.
- *Quantity of Information*: Assesses the extent of coverage and whether the information provided is comprehensive but concise.
- *Visual Information*: Examines the clarity and accuracy of visual aids, such as graphs, charts, or videos.
- *Credibility*: Evaluates the legitimacy of the app's source (e.g., government, university, or trusted institution).
- *Evidence Base*: Rates the app's support by scientific evidence, including randomized controlled trials (RCTs).

The fifth section "subjective quality" captures the rater's personal impressions and overall experience with the app. While subjective, these items provide valuable insights into the app's perceived utility, satisfaction, and value to potential users.

- *Recommendation Likelihood*: Assesses how likely the rater is to recommend the app to others.

- *Frequency of Use*: Estimates how often the rater would use the app over 12 months if relevant to their needs.
- *Willingness to Pay*: Reflects the app's perceived value in terms of willingness to pay for it.
- *Overall Star Rating*: Provides a holistic rating of the app based on the rater's overall impression.

5. Case studies analysis

Applying the defined selection criteria, 20 examples of mobile applications focused on sustainable food choices were identified. The complete list of analyzed applications is available in [Figure 1], along with the selection criteria [Figure 2].
As mentioned, the selection does not only include apps that concern the purchase of healthy food, but also those that educate on a more sustainable diet, that allow to reduce food waste in various ways and to have a more ethical and balanced menu.
The first step of the analysis required categorising these applications based on their primary objectives and functionalities, which align with key dimensions such as education, behavioral change, transparency and accountability, decision support, and community engagement.

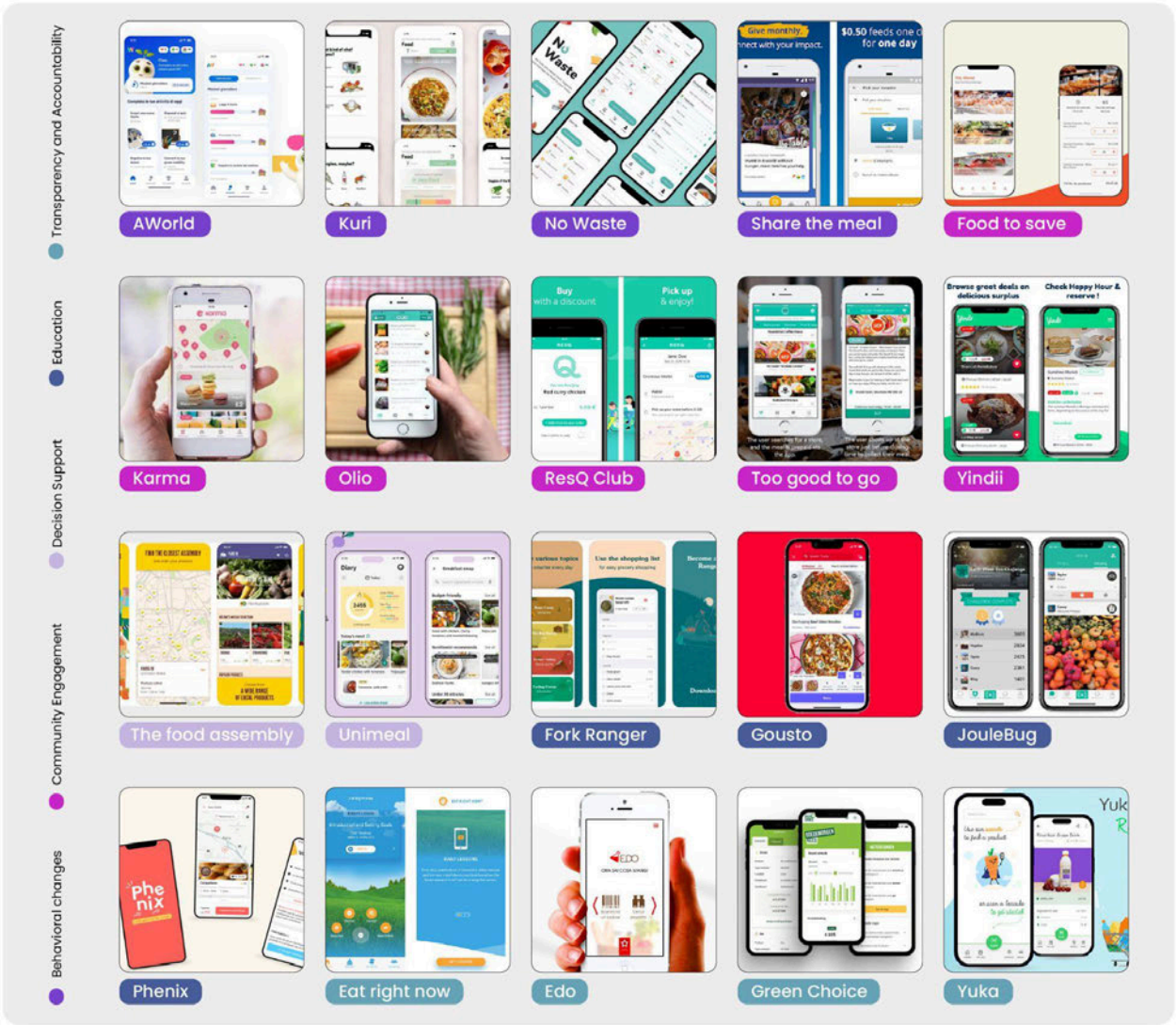

Figure 1. Interfaces of the twenty mobile applications selected and classified according to their core objectives.

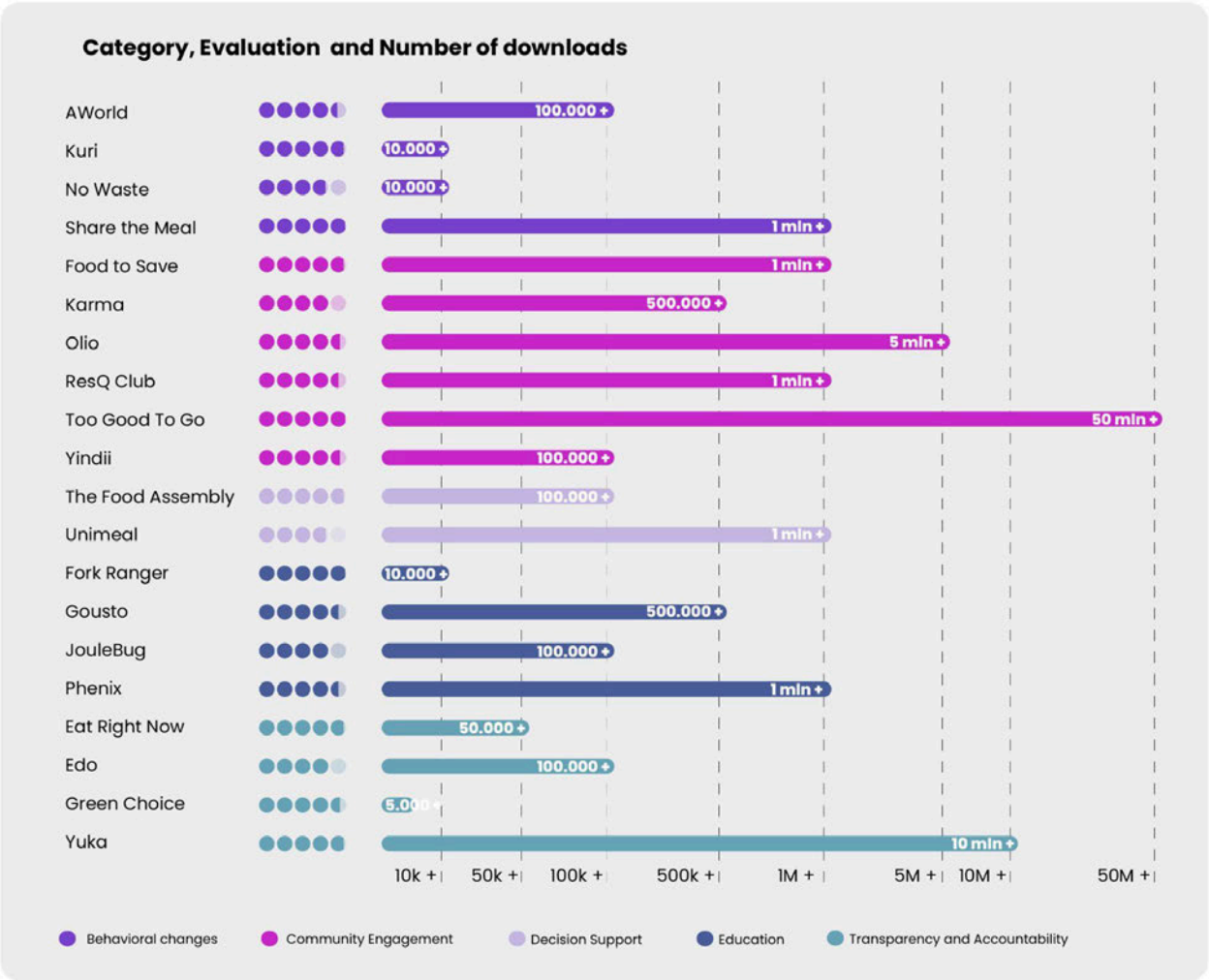

Figure 2. The infographic presents the twenty applications analyzed by identifying their categories, user ratings and total number of downloads.

5.1. Categories of ethical food mobile applications

- Education-Focused Applications
  Educational apps have been developed for the purpose of raising awareness and informing users about the impact of their food choices. These applications offer insights into subjects such as food waste, environmental impact, and nutritional value. For instance, *JouleBug* employs gamification techniques to promote sustainability, utilising challenges and recommendations to minimise waste. Similarly, *GreenChoice* utilises detailed product scores to educate users about the environmental impact of various grocery items.

- Behavioral Change-Oriented Applications
  The utilisation of behavioural change applications has emerged as a significant strategy in promoting sustainable practices among users. These applications employ various techniques, such as nudges, reminders, and gamification, to motivate users to adopt sustainable habits. Notable examples of this include the apps *Too Good To Go* and *Olio*, which have been shown to engender a sense of urgency and motivate real-time actions

to avert the waste of surplus food. These apps leverage behavioural science techniques, such as loss aversion, to motivate users to participate.

- Transparency and Accountability
  Transparency-focused applications empower users by furnishing them with detailed product information, including ingredients, sourcing, and ethical certifications. Applications such as *Yuka* and *Edo* facilitate the scanning of product barcodes, thereby providing immediate feedback regarding the health and environmental impact of items. These applications have been shown to encourage responsibility by drawing attention to unsustainable practices within the food supply chain.

- Decision Support Tools
  Decision-support applications facilitate the process of ethical decision-making by providing users with curated recommendations or alternatives. For instance, *GreenChoice* utilises filtering mechanisms to categorise products based on sustainability and dietary preferences, while *NoWaste* assists users in planning meals by leveraging their existing pantry inventory to minimise waste.

- Community Engagement Platforms
  Community-driven applications are centred on the establishment of connections among users with the objective of promoting shared objectives, such as the reduction of food waste or the support of local producers. Examples of such apps include *Olio* and *Food Assembly*, which facilitate the exchange of surplus food within communities, emphasising collaboration and shared responsibility. These platforms frequently incorporate social networking features, thereby enhancing user engagement.

In order to gain a more deep understanding of the impact of these applications, an analysis was conducted on download counts and user ratings from app stores. Applications such as *Too Good To Go* and *Olio* exhibited high levels of user adoption, with millions of downloads and average ratings in excess of 4.5 stars. These metrics highlight user satisfaction and the perceived value of these tools. Conversely, less popular applications, such as *JouleBug*, exhibited niche appeal, catering to specific user groups but with lower overall adoption rates.

5.2. Analysis by MARS evaluation criteria

After having collected and selected the apps, divided them into categories according to the objectives of each one and collected the numbers relating to downloads and evaluations, the analysis and evaluation phase began by filling out the MARS sheet for each application. In this way each app can be systematically assessed for its effectiveness in promoting sustainable food behaviors. A detailed analysis was carried out for each application, the results of which are summarised below. The final scores obtained by the applications according to the five criteria of the MARS scale are taken into consideration, and the most successful applications for each of these are highlighted. This will facilitate comprehension of the most effective design elements for this application type and potential enhancements in the design of analogous products.

Engagement [Figure 3] is defined as the extent to which an application successfully captures and retains the interest of its users. Applications that demonstrate high performance in this domain incorporate features that are interactive, gamification mechanisms, and personalisation elements. To illustrate this point, consider the example of the *Too Good To Go* app, which utilises real-time notifications to alert users to available surplus food, thereby creating a sense of urgency. Similarly, *JouleBug* employs leaderboards and achievements to foster competition among users. Conversely, applications with static interfaces and limited interactivity, such as *NoWaste*, encounter difficulties in sustaining long-term user engagement, despite their practicality. Community engagement is another critical aspect. Exemplary apps in this regard include *Olio* and *Food Assembly*, which utilise food-sharing platforms and local initiatives to foster social connections. These features not only increase user activity but also contribute to broader societal goals, such as reducing food insecurity and building resilient communities.

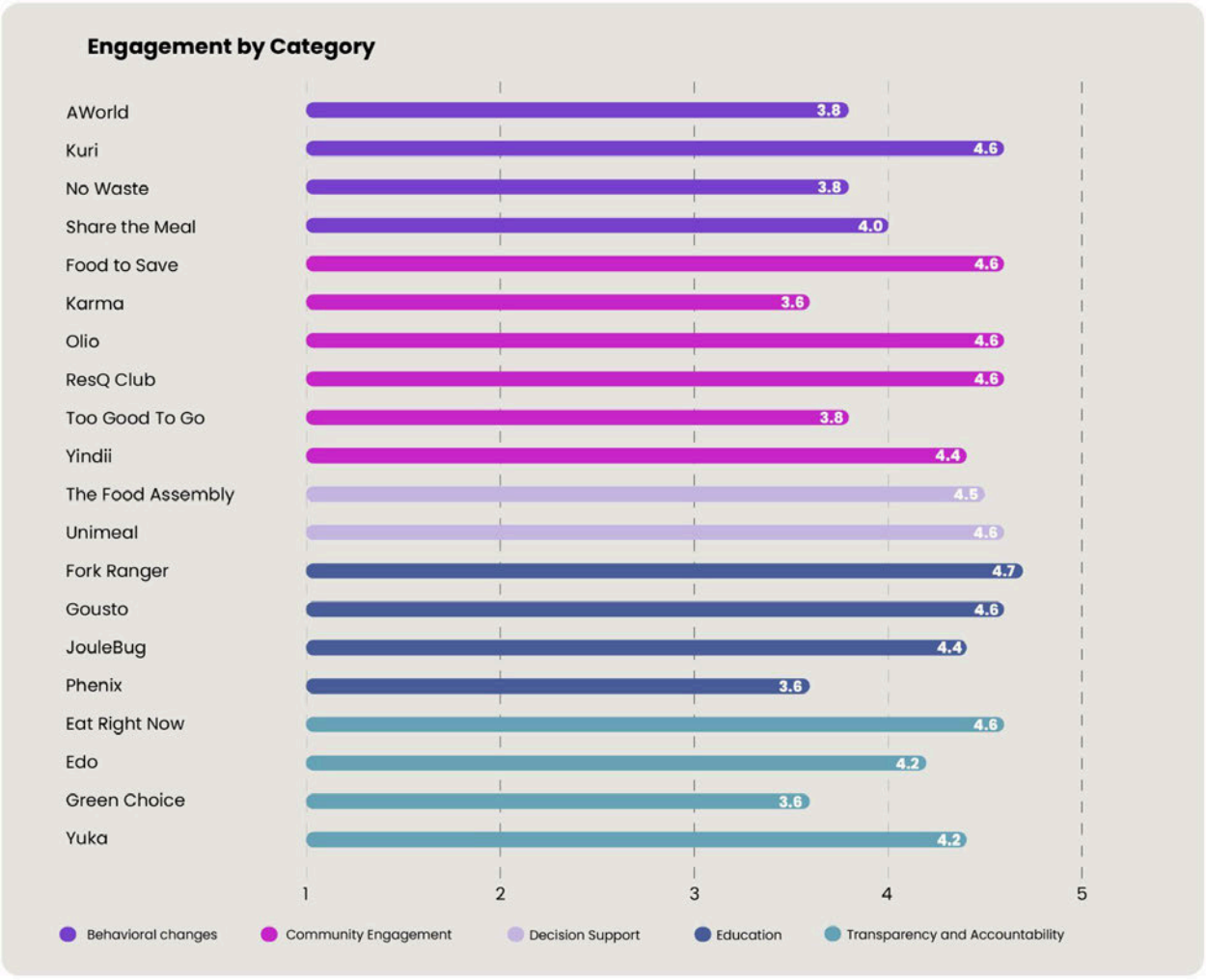

Figure 3. The infographic presents the twenty applications analyzed by identifying the categories they belong to and the evaluation of the engagement parameter, according to the MARS sheet.

Functionality [Figure 4] is defined as the technical performance and usability of an application. This encompasses parameters such as speed, reliability, and ease of navigation. Notable examples of such applications include *Yuka* and *GreenChoice*, which are distinguished by their advanced barcode scanning capabilities, providing users with

immediate feedback on the sustainability of products. These functionalities are complemented by intuitive interfaces that guide users effortlessly through complex information.
Conversely, certain applications have been observed to demonstrate deficiencies in their technical capabilities. For instance, users of *Phenix* have reported intermittent crashes and protracted load times, which may impede the app's adoption. Furthermore, the absence of offline functionality in certain apps, such as *Too Good To Go*, poses challenges for users in areas with limited internet connectivity.

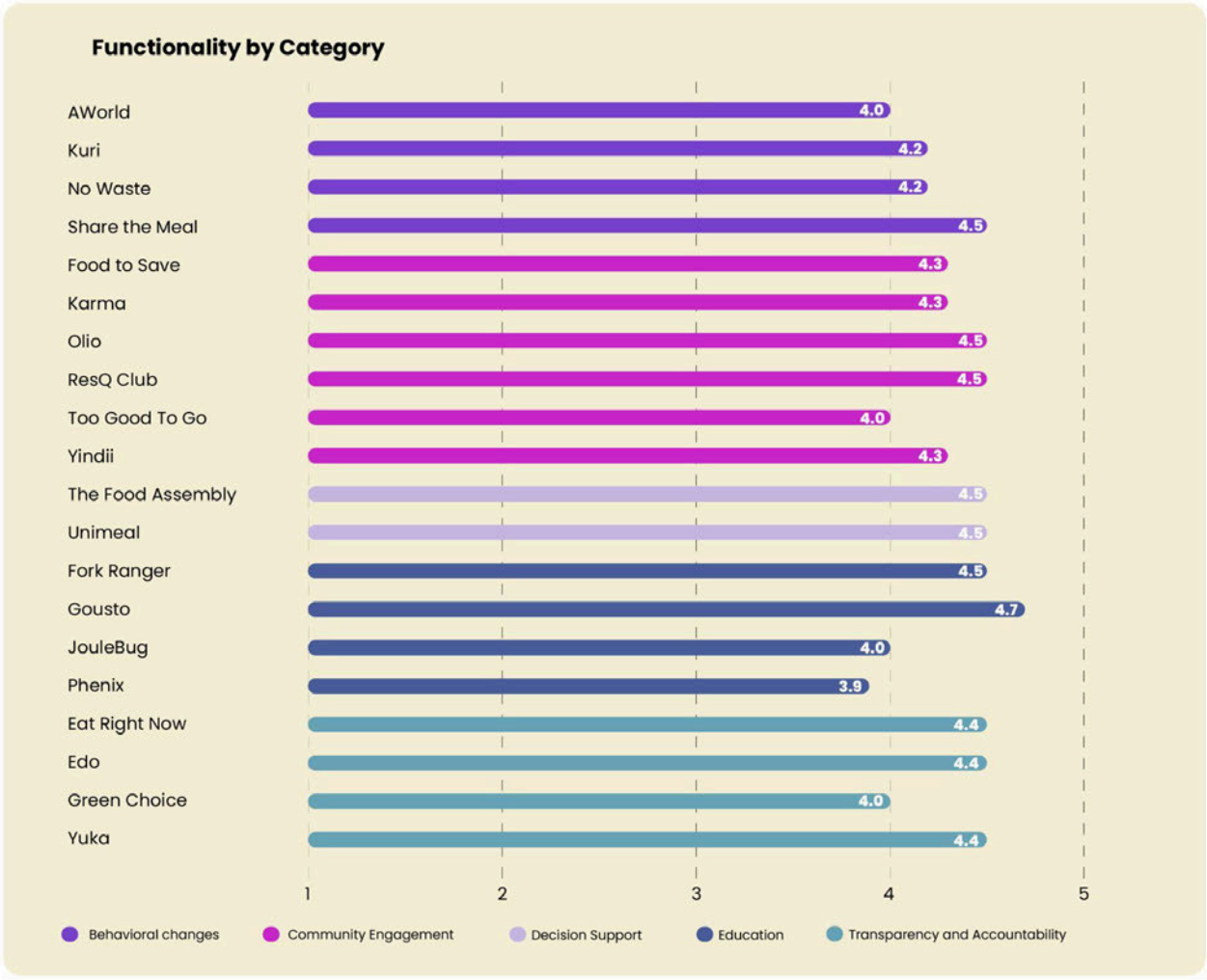

Figure 4. The infographic presents the twenty applications analyzed by identifying the categories they belong to and the evaluation of the functionality parameter, according to the MARS sheet.

The concept of *aesthetics* [Figure 5] in the context of software applications refers to the visual design and overall appeal of the application. Effective applications, such as *Olio*, employ clean layouts, consistent colour schemes and visually engaging graphics to enhance the user experience. The efficacy of these design choices is twofold: they enhance the aesthetic appeal of the application and improve its usability by reducing cognitive load.
However, it is important to note that not all applications meet these standards. A case in point is the *Karma* interface, which is characterised by a cluttered layout and an absence of visual hierarchy, potentially causing users to experience being overwhelmed. This underscores the

importance of aligning aesthetic design with functional goals to create a cohesive user experience.

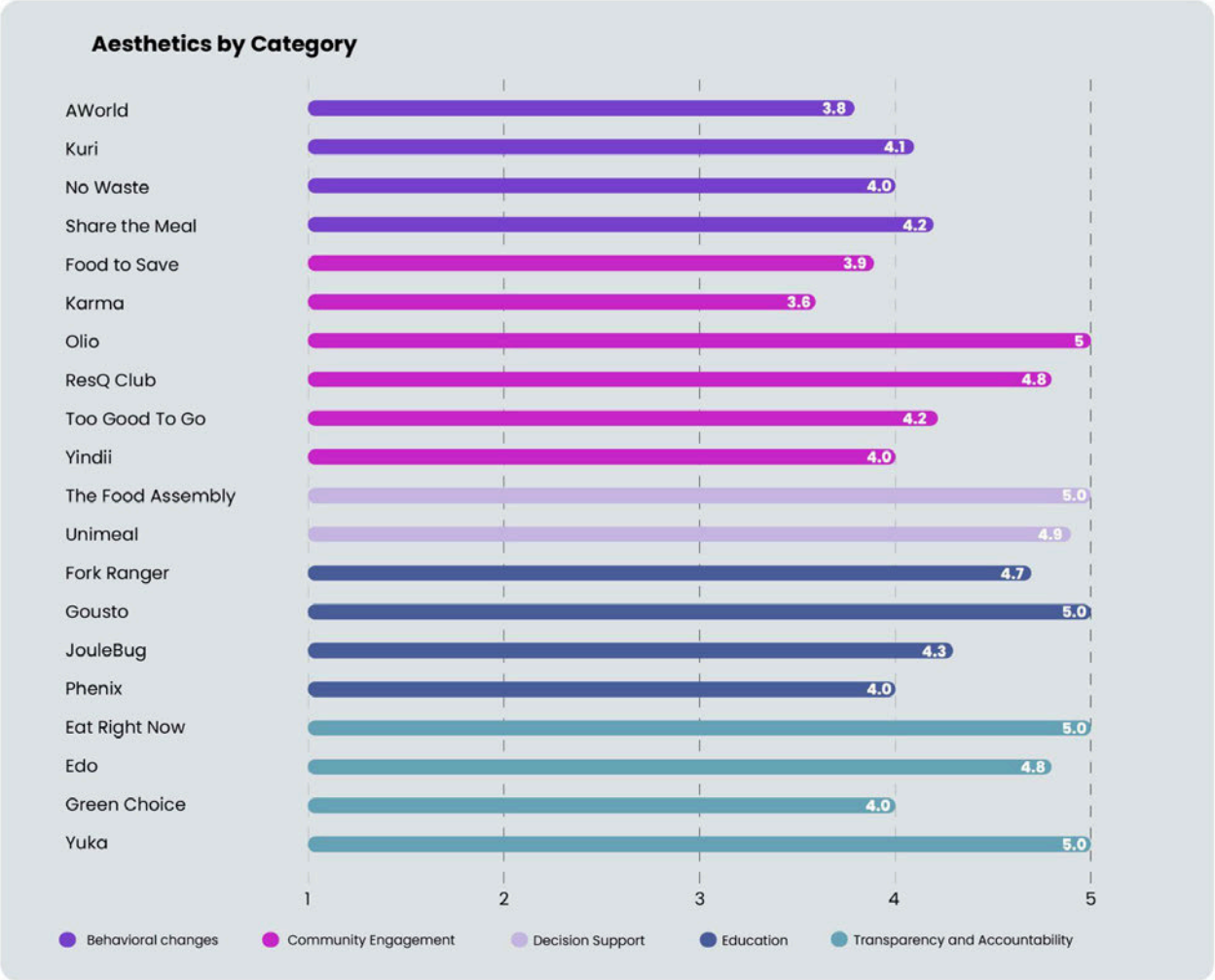

Figure 5. The infographic presents the twenty applications analyzed by identifying the categories they belong to and the evaluation of the aesthetic parameter, according to the MARS sheet.

The *quality of information* [Figure 6] provided by an application is critical for its credibility and effectiveness. Applications such as *Yuka* and *Edo* are exemplary in this domain, as they provide scientifically validated data on product health and environmental impact. These applications frequently incorporate citations from reputable sources, thereby enhancing their perceived reliability.

Nevertheless, the depth and breadth of information vary significantly among apps. For instance, while the *Too Good To Go* app's emphasis is on pragmatic solutions to address food wastage, it provides comparatively limited educational material, as evidenced by its similarity to *JouleBug*. This discrepancy can be attributed to the differing objectives and target demographics of these platforms.

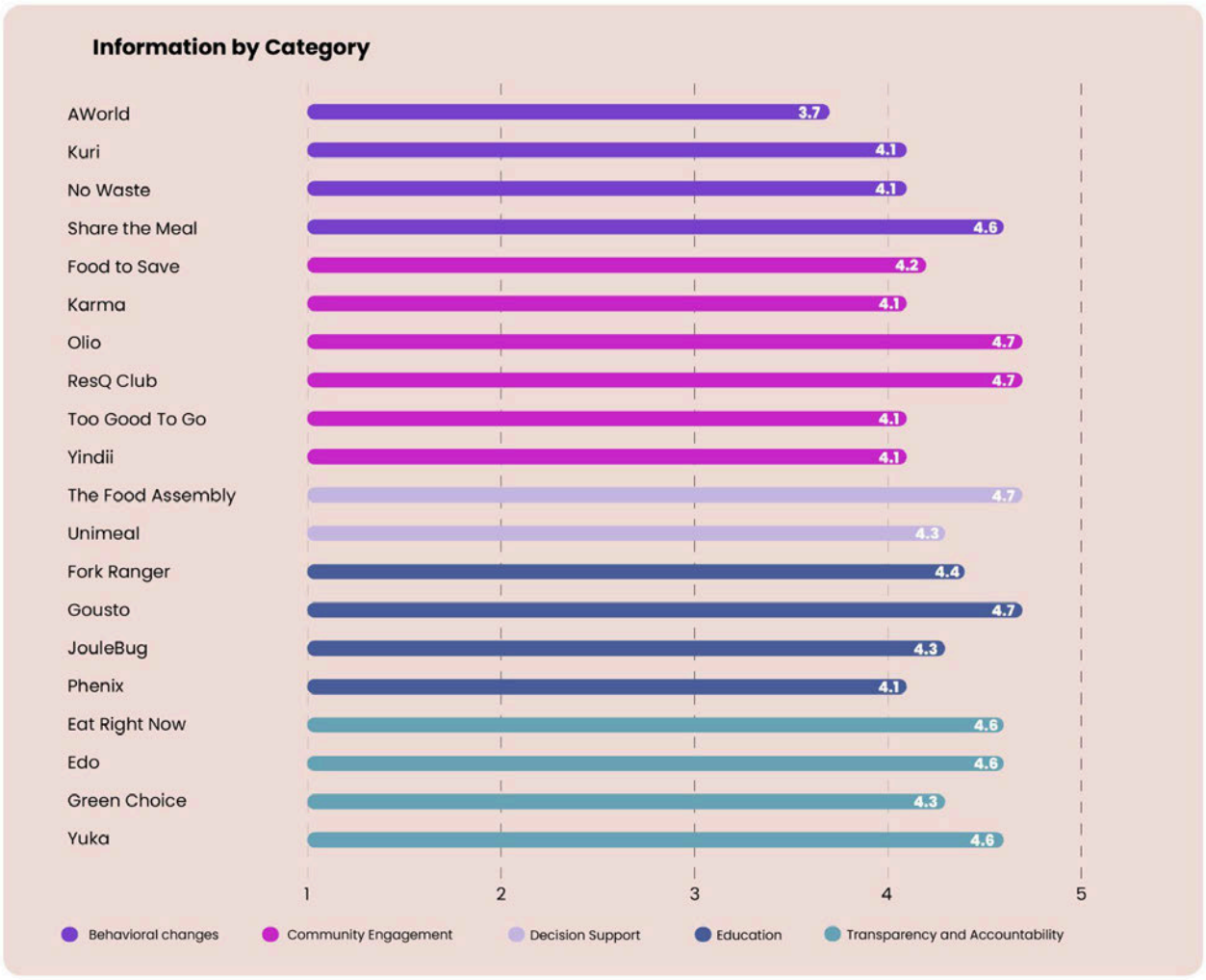

Figure 6. The infographic presents the twenty applications analyzed by identifying the categories they belong to and the evaluation of the information quality parameter, according to the MARS sheet.

Subjective quality [Figure 7] is defined as the user's perception of an app, including its ease of use, relevance, and overall value. High-rated applications such as *Gusto* and *Fork Ranger* have been shown to receive positive feedback with regard to their impact and practicality. Users value the tangible benefits of these apps, such as financial savings and reduced waste, which align with personal and environmental goals.
Conversely, apps with lower ratings are often the subject of criticism regarding technical issues or a lack of clear value propositions. For instance, some users of *Aworld* reported difficulty in setting up their pantry inventory, highlighting the need for more intuitive onboarding processes.

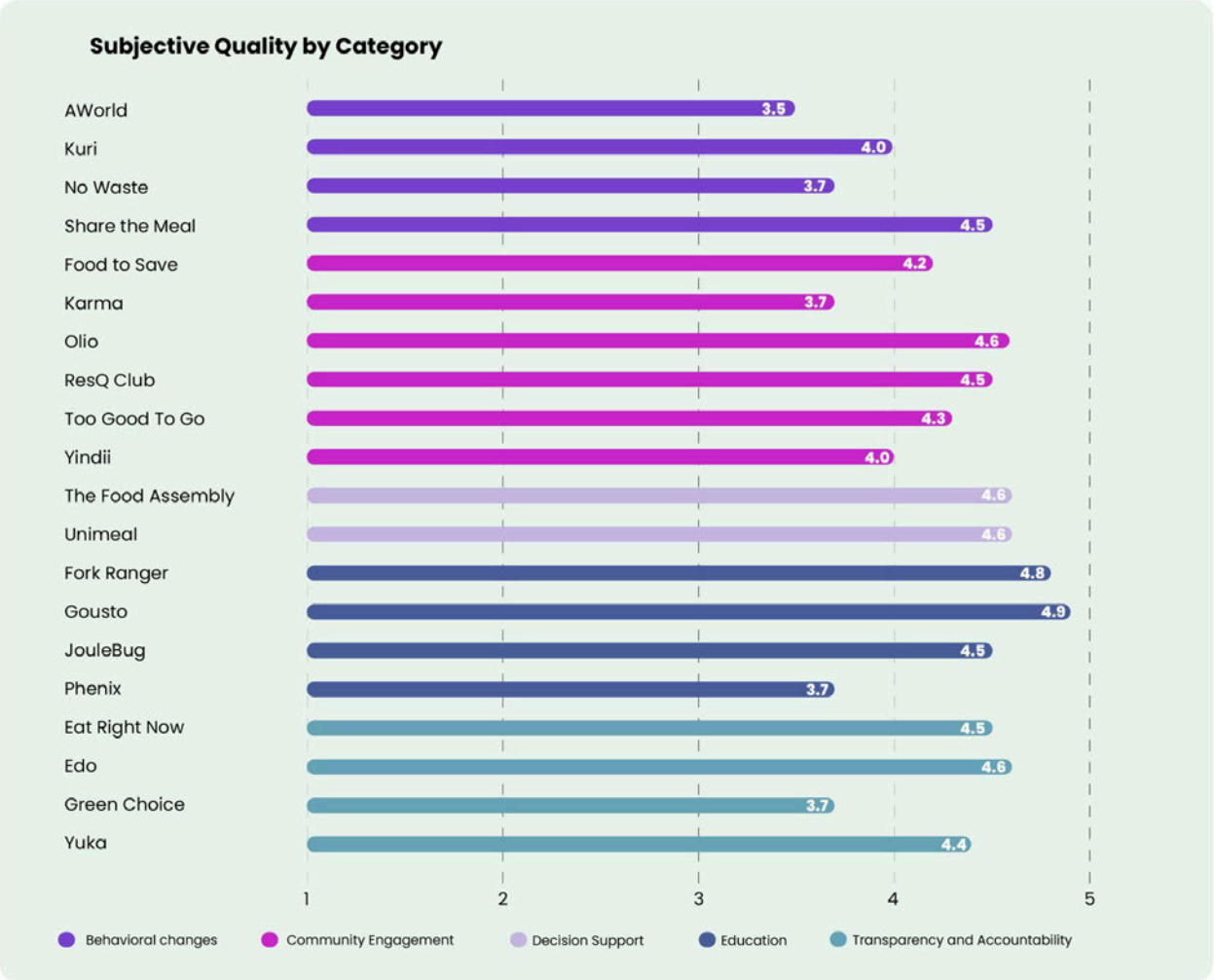

Figure 7. The infographic presents the twenty applications analyzed by identifying the categories they belong to and the evaluation of the subjective quality parameter, according to the MARS sheet.

6. Discussion and conclusion

This case studies analysis underscores the heterogeneity of approaches to promoting ethical food choices and their divergent levels of effectiveness. By employing a categorization system based on five key dimensions — education, behavioral change, transparency and accountability, decision support, and community engagement — it becomes evident that each app category addresses unique aspects of sustainable consumer behavior.
Furthermore, the comparison between the MARS sheet analyses highlights that the most successful apps integrate multiple dimensions, leveraging engagement, functionality, and information quality to maximize their impact. Nevertheless the highest scores were achieved, according to the authors, in the "aesthetic choices " category, as seen in [Figure 8].
This comprehensive evaluation offers a detailed understanding of the opportunities and challenges in designing digital tools for ethical food choices, paving the way for future innovations in this field.

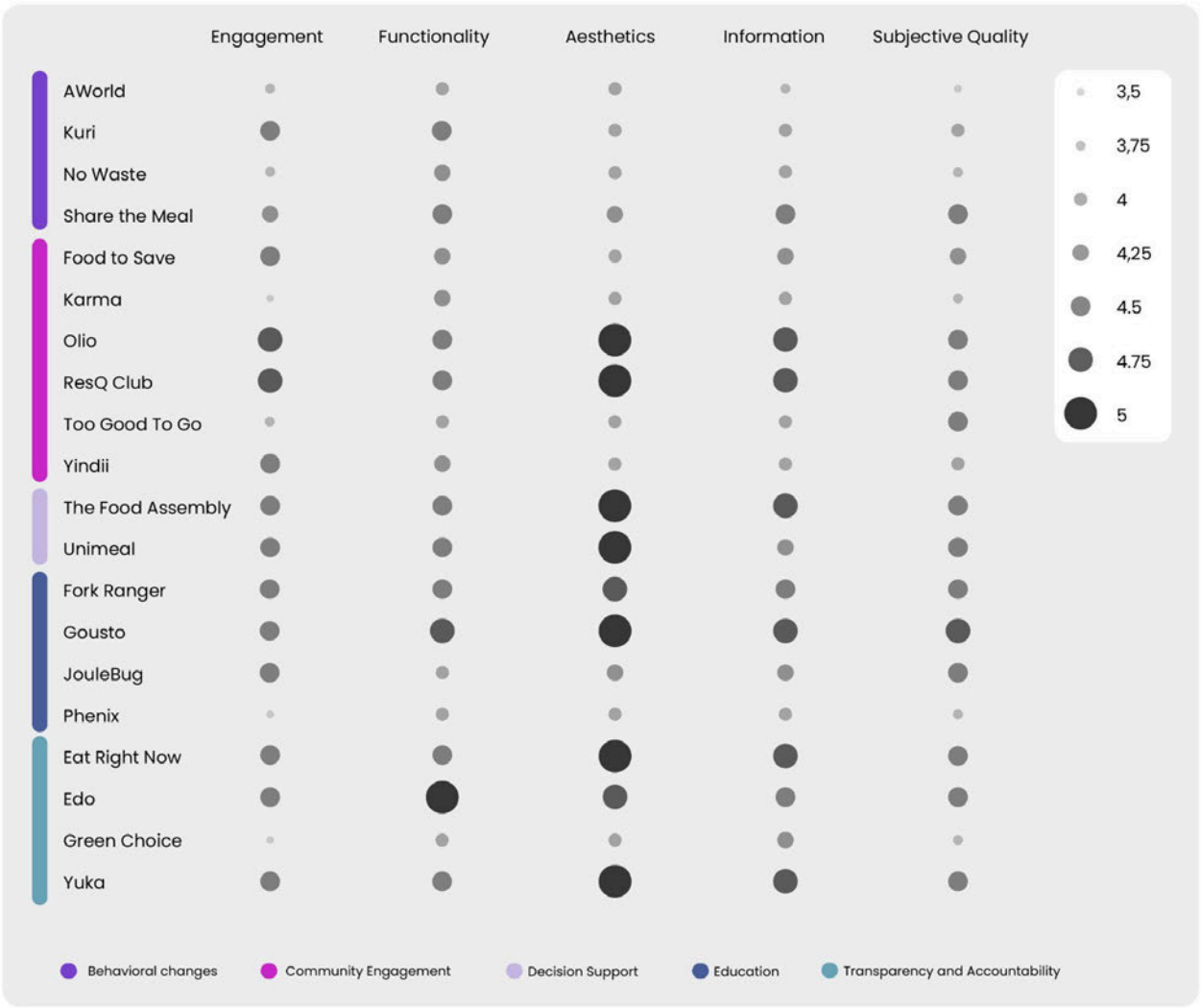

Figure 7. The infographic compares the twenty applications according to all the five MARS categories and evaluates them according to the MARS five-point scoring system.

A substantial body of research has identified that a significant proportion of users tend to discontinue the use of apps shortly after downloading them, primarily due to an absence of immediate results or engagement (Shah et al., 2022). Consequently, it is imperative to evaluate the quality of interfaces, navigability, and content to ensure sustained user engagement (Roy et al., 2020). The incorporation of personalised recommendations and gamification strategies has been demonstrated to enhance user experience and promote long-term commitment to ethical food choices (Stifani et al., 2023). As a result of the analysis of the case studies, several design strategies can be identified as being critical for creating impactful and effective applications in this domain.

- Integrating Education and Gamification: Combining educational content with gamified elements can enhance user engagement and promote behavioral change. For example, incorporating challenges, rewards, and progress tracking motivates users to adopt sustainable habits. Apps like JouleBug demonstrate how gamification can transform sustainability into an engaging activity.
  Gamification strategies can include daily challenges, interactive leaderboards, and badges for milestones. For instance, apps could reward users who save a specific amount of food or complete a week without wasting groceries. These strategies can

create a sense of accomplishment while embedding sustainable habits in everyday routines.

- Enhancing Transparency and Accountability: Applications should provide clear, accessible, and scientifically validated information about the ethical and environmental impact of food products. Barcode scanning features, as seen in Yuka and Edo, can empower users to make informed decisions. Transparency builds trust and fosters long-term engagement.
  Enhancements in this area could involve real-time updates on product sustainability scores or partnerships with ethical certification bodies. For example, integrating blockchain technology could improve traceability, allowing users to verify the origin and environmental impact of a product throughout its supply chain.
- Leveraging Community Engagement: Encouraging users to participate in collaborative efforts, such as food-sharing platforms or local initiatives, can strengthen the social impact of these apps. Features like community forums, event planning tools, and real-time sharing capabilities can foster a sense of collective responsibility.
  For instance, apps could implement neighborhood-based challenges where users collaborate to reduce a predefined amount of waste. Additionally, integrating feedback mechanisms, such as user reviews of food-sharing experiences, could strengthen trust and encourage active participation.
- Improving Accessibility and Usability: Ensuring that apps are intuitive, responsive, and accessible across diverse user groups is essential. Simplified onboarding processes, offline functionality, and support for multiple languages can broaden the reach and inclusivity of these tools.
  Accessibility-focused design can include voice recognition for visually impaired users or simplified interfaces for those less familiar with digital technologies. Apps like Too Good To Go could also integrate offline meal planning tools to assist users in areas with limited connectivity.
- Incorporating Behavioral Science Principles: Apps can integrate nudges, reminders, and loss-aversion strategies to influence user behavior effectively. For example, Too Good To Go uses real-time notifications to encourage immediate action, leveraging urgency to drive engagement.
  Additional principles, such as positive reinforcement and visual storytelling, could be utilized. For instance, showing users their cumulative impact—such as the amount of food saved or emissions reduced—can reinforce sustainable behaviors. Highlighting small, achievable actions fosters long-term adherence.
- Supporting Decision-Making with AI: Advanced algorithms and AI-driven recommendations can tailor the user experience to individual preferences and needs. By analyzing user behavior and providing personalized suggestions, apps like GreenChoice help users align their choices with sustainability goals.
  Expanding AI capabilities can include predictive features, such as recommending recipes based on expiring pantry items, or alerting users about local food-sharing events. AI can also analyze broader trends to offer community-wide suggestions for collective impact.
- Balancing Aesthetics and Functionality: A visually appealing interface should complement, rather than compromise, an app's usability. Clean design, consistent

layouts, and well-organized information can enhance user satisfaction while ensuring functionality remains a priority.
Designers can experiment with dynamic visual elements, such as progress dashboards or interactive maps, to present data in an engaging yet intuitive manner. Moreover, incorporating color schemes aligned with sustainability themes (e.g., greens and earthy tones) can reinforce the app's mission.

- Prioritizing Long-Term Engagement: Features that encourage repeated use, such as daily tips, habit trackers, and progress reports, can sustain user interest over time. Gamified rewards and social validation mechanisms can further reinforce positive behaviors.
  Apps could introduce seasonal challenges or community-wide goals, such as reducing food waste during holidays. By periodically refreshing content and goals, apps can maintain user interest and prevent stagnation.

By adopting these strategies, designers can create applications that not only address the challenges of promoting ethical food choices but also inspire lasting behavioral changes among users.

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ethical leadership
a new frontier for design

Designing for Dignity: Addressing Food Insecurity & Mental Well-Being Among Aging Adults

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ABSTRACT

Over the past decade, extensive discussions have centered on the United Nations and its Sustainable Development Goals (SDG). As human-centered designers, how can we make an impact on individuals and communities? What role can designers and design educators play in collaborating with communities to ensure that our designs align with the needs and aspirations of both organizations and residents?

In the United States, communities are grappling with systemic inequities that disproportionately affect older adults, particularly concerning food insecurity. A design study investigating food insecurity in older adults was undertaken at Indiana University in Indianapolis, one of the top five universities in the United States recently recognized for research progress toward the UN SDG. Since 2020, Central Indiana has experienced over 50% increase in people requesting food assistance. Thus, the research investigates essential aspects, including dietary requirements, the existence of food deserts, challenges related to mobility and accessibility, and the impact of social services on the mental and social welfare of older adults. The goal is to pinpoint effective modifications in food systems and support frameworks to improve their overall quality of life.

A critical aspect of the study emphasizes the authors' pedagogical approach within the undergraduate Visual Communication Design curriculum and how this design project was developed and facilitated within a virtual global exchange with students from South Korea in a studio classroom environment.

Practicing empathy in DESIGN

DESIGN WITH CARE

DESIGN FOR CARE

DESIGN TO CARE

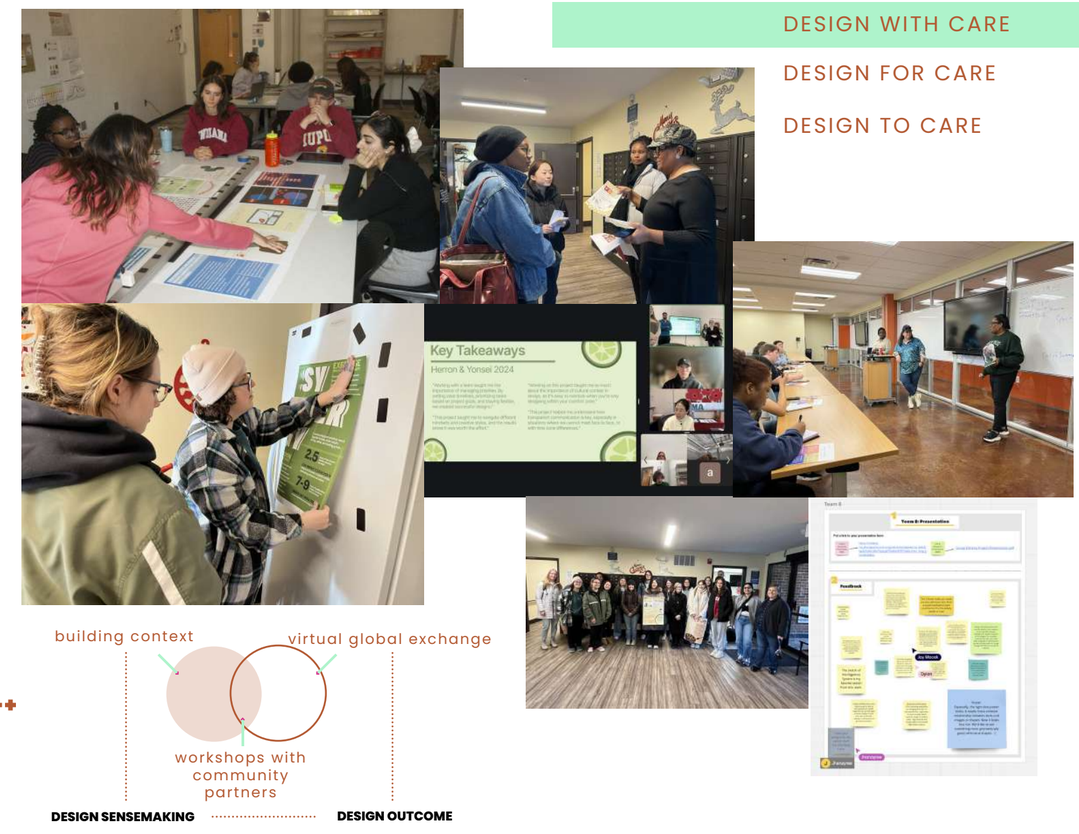
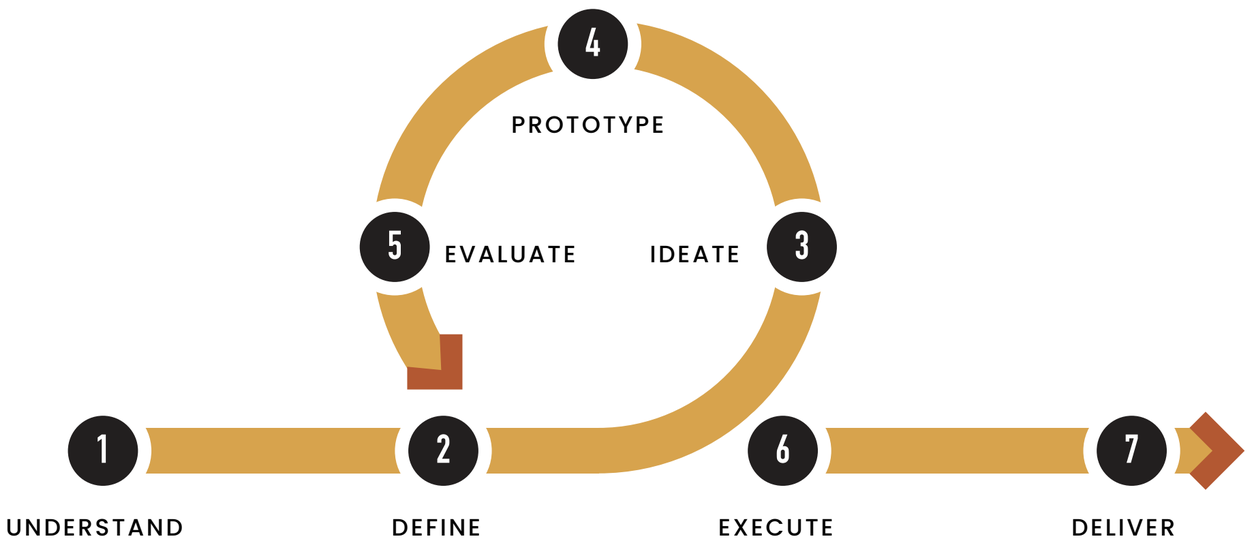


Image Description: Design research for analysis initial discussion, collaborative workshops and feedback, community interactions and virtual global exchange of design solutions and prototyping via Zoom.

TEACHING METHODOLOGY



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Collaborative Action Research in Design (CARD) Process

PROJECT PURPOSE

+ To collaborate with community partners and utilize the design process that can drive a positive change and contribute to the Sustainable Development Goals.

++ To educate elderly populations about nutrition, food programs, and how to access help.

+++ To visualize a series of posters that draws attention to the issue of food insecurity among the elderly.

PROCESS, CHALLENGES AND OUTCOMES

To execute this project, we followed the seven-phase Collaborative Action Research in Design (CARD) Process Model developed by Herron School of Art + Design.

Understand: Student designers met with our partners at the Boner Center to learn about how they support seniors with food security and understand their communication needs on the topic.

Define: As a part of the virtual global exchange, students from Herron & Yonsei divided into groups with different defined problems to address, ranging from "Exercise and Food Synergy" to "Hydration for the Elderly" & conducted independent research.

Ideate-Prototype-Evaluate: Each team ideated about how to design effective visuals for Boner Center clients, developed protoypes, and offered their work to the larger group for critique and evaluation. This iterative cycle was repeated until each group produced refined work that communicated its message well for the Senior Center audience.

Execute: Once teams created final versions of their designs, they produced professional quality printed posters and/or pamphlets.

Deliver: For the final step in the CARD Process, Herron students delivered their materials to the Boner Center, installing posters in the Senior Center and giving pamphlets to staff to share with clients.

While navigating this community-engaged learning experience, students faced the challenge of empathizing with the elderly–considering typeface and font size that would be readable and color choices that would be high contrast for people with low vision. Students also had to learn about unfamiliar topics and expand their engagement in the community.

Students learned to use the CARD process to work with community partners and develop designs that address sustainable development goals. Designs were well received at the Boner Center, and the seniors were particularly interested as they saw the flood of young adults installing their work on delivery day.

The center staff and clients talked with the students, and everyone seemed to enjoy participating in the work together. Hopefully, our students' work and their messages will have a positive impact on the Boner Center senior community.

COMMUNITY ENGAGEMENT STRATEGIES

12.9% of Central Indiana residents age 50-59 were food insecure in 2020.

In 2022, America's Health Rankings Senior Report ranked Indiana as 42nd overall for enrollment in the Supplemental Nutrition Assistance Program

Source: State of Aging Central Indiana

Project partner

JOHN BONER NEIGHBORHOOD CENTERS

Guest collaborator

YONSEI UNIVERSITY

VISUAL DESIGN OUTCOMES

Image Key: **1.** *Poster regarding Food Access in Indianapolis.* **2.** *Brochure design focused on Food Nutrition, Diet For the Day.* **3.** *Poster on Impact of Diet on Blood Pressure and Cardiovascular Health.* **4.** *Poster on Exercise and Food Synergy.* **5.** *Brochure on Meal Planning for Seniors with Chronic Conditions.* **6.** *Brochure on Importance of Hydration.* **7.** *Poster on the Importance of Fiber Intake!*

HERRON SCHOOL OF ART AND DESIGN

LOCAL COMMUNITY PARTNERSHIP

DESIGN FOR A COLLABORATIVE PROCESS IDENTIFYING ROOT PROBLEMS

IMPROVE THE QUALITY OF LIFE IN NEAR EAST SIDE INDIANAPOLIS

UNITED NATIONS

NO POVERTY | ZERO HUNGER | GOOD HEALTH & WELL BEING

AREAS OF ALIGNMENT

Food Transition

Food Serenity and Environmental Challenges

JUNE 3-7, 2025

Cumulus Association

L'ÉCOLE DE DESIGN Nantes Atlantique

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DESIGNING TRANSITION FOR CUSTOMER FOOD JOURNEY

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ABSTRACT | Long-term research around customer-driven Service Design for environmentally sustainable consumption has also been applied to Customer Food Journeys to enable the necessary change in food consumption. Consumer research has typically found an attitude-behaviour gap hindering sustainable behaviour change (White & Habib, 2018). Tools based on consumer research contain the idea, that consumers would need environmentally sustainable solutions as services that blend effortlessly with their everyday lives (Kälviäinen, 2019). This is especially evident with our daily food consumption amid everyday life's pressures. The behaviour change understanding with triggers and nudges deriving from behavioural psychology (e.g., Bucher, 2020), combined with an enabling journey supports crossing over the barriers and motivation with drivers of environmentally sustainable food behaviour. Since one-third or at least one-fourth of the global emissions come from our food systems (Ritchie, 2021), the environmentally sustainable food transition is a critical measure in mitigating climate change. It is even more important in combatting biodiversity loss, with the emerging calculations of food production being the major factor, with approximately 80% of the food agriculture land dedicated to inefficiently feeding meat-purpose animals. The Customer Food Journey design for behaviour change has been a target case with the developed tools for customer-driven service design in various international contexts. The analysis of the food journey workshops with international design students and professionals has verified the wide frame for food consumption encompassing consumers' identities, social-cultural heritage, and networks. In addition, the workshops have demonstrated how the Consumer Food Journey is a long multi-moment journey with a variety of touchpoints, physical evidence, and intervention possibilities. It stretches from the diversity of attitudes and interests with food and lifestyle connections (e.g. health and well-being) to opportunities, information sources, knowledge, and contexts applied in purchasing, to capabilities of cooking, and to measures of avoiding or handling waste. All of this enforces the

importance of solutions encompassing the psychological knowledge of behaviour change described in the Michie et al. (2011) COM-B model as the joint activation of capabilities, opportunities, and motivation. These form the building blocks for behaviour change with Customer Food Journey moments. In detailed touchpoint design, the psychological heuristics and biases of fast thinking are also helpful. (Kälviäinen, 2021). The Customer Food Journey solutions can be applied to food transition requirements by the government, counties, cities, and businesses such as restaurants, food markets, transportation, and even farms or producer networks striving to drive the food transition. For many food businesses, the significant environmental sustainability impact can be demonstrated by measures supporting the food consumption transition towards less wasteful vegetarian nutrition. Instead of a decreased footprint impact of production, an increase in the impact of the handprint is required, allowing less impact on solutions' consumption and leading businesses to good net impact results (e.g., Upright Project). This is not a measure to be achieved by the provision part only, but to function; it requires consumption behaviour change.

KEYWORDS | SUSTAINABILE CONSUMPTION, BEHAVIOR CHANGE, FOOD DESIGN, SERVICE DESIGN, BEHAVIORAL HEURISTICS

1. Introduction

Designer-based development with food-related issues includes food design alternatives for farmers, alimentary industries, and food stores to grow, produce, and distribute food. It can also create novel offerings for consumers to purchase, cook, and eat, transforming the roles of food in people's lives and in social-cultural communities. (Lee et al., 2020). This all points to the design of systems-based production-consumption processes.

Globally even one-third of the emissions come from our food systems (Ritchie, 2021). Transition to environmentally sustainable food is a critical measure in mitigating climate change, even more so in combatting biodiversity loss. Approximately 80% of the food agriculture land is dedicated to inefficiently growing food for meat-purpose animals. Designing sustainable food systems with products, practices, and experiences that minimize environmental impact, promote biodiversity, and support local economies is required. Compared to other environmental impact areas of consumption (mobility, housing, products, and services), food has accounted for less than one-fourth of the consumption's influence on carbon dioxide emissions (Salo & Nissinen, 2017) but emerging research on consumption's biodiversity impact demonstrates food as the most harmful area of consumption.

Designers are professionals in solution desirability and human-solution interactions. In sustainable food design, the interaction focus leads easily to technological solutions (examples of sustainable food design in Castanho et al., 2024). However, acceptability and adapting the new solutions to use are what counts. Consumer research has constantly found evidence of an attitude-behaviour gap hindering sustainable behaviour even when people's attitudes are pro-nature (White & Habib, 2018). Research on environmentally sustainable behaviours has demonstrated that consumers need environmentally sustainable solutions as services that blend effortlessly with their everyday lives. Amid everyday life's pressures this is especially evident with our daily food consumption. In complex everyday life food-related activities happen amongst a multitude of other activities and as a long process such as getting the food, cooking, eating it, and taking care of the leftovers. (Kälviäinen, 2022).

A customer journey framework for environmentally sustainable customer solutions has been developed based on service design combined with understanding and tools from behaviour change psychology (Kälviäinen, 2019). In this paper, Customer Food Journey tasks from ten years of workshops are used to demonstrate how to put the framework into practice. Marchand (2013) describes how strong, sustainable consumption includes the reasonableness of consumption on many levels: taste, purchase, and lifestyle decisions. The analysed workshops have focused on food since people need to eat every day, and food design forces to reflect on sufficiency instead of designing unnecessary products. It also has the potential to truly regenerative design solutions.

2. The requirements, barriers, and drivers for food transition

The ecological food consumption requirements for a hoped-for transition exist in many guidelines. Salo and Nissinen (2017) propose eating sustainably by buying only the necessary amount of food and avoiding waste by using food before expiring dates or purchasing food close to expiring date and restaurants' leftovers. People should buy local and seasonal food and favour local vegetables, beans, lentils, soy, and fish. Less meat

(especially red) and fewer dairy products (especially hard cheeses) should be used.

New recommendations for healthy eating were published in Finland as a food pyramid (Figure 1) in autumn 2024, based on the Nordic recommendations by 300 nutrition researchers. The purpose was to cover environmental sustainability requirements in addition to research-based guidance for a healthy diet. The decrease in the use of red meat supports both purposes. The recommendations suggest a diet based on a variety of vegetables, lentils, and mainly fish as protein instead of other animal meat. (Valtion ravitsemusneuvottelukunta, 2024).

Figure 1. The Finnish food pyramid from the national food recommendations (Valtion ravitsemusneuvottelukunta, 2024).

Diet recommendations serve as food design guidelines demonstrating the direction where to steer consumers' food choices. Attention should be paid to the strong relationship between eating habits, social-cultural traditions, and identity demonstrated by the heated discussion around the Finnish eating recommendations. Eating is a delicate and multifaceted issue. Siltamäki's (2024) column around the Finnish recommendations invited hundreds of even defiant comments. Individual freedom

claims spread on social media, presenting the environmental good as evil when it threatened the personal social-cultural-identity-related habits.

Using only science-based diet requirements does not tackle the environmentally sustainable food consumption challenge. The consumer research findings of an attitude-behaviour gap hindering sustainable behaviour change (White & Habib, 2018) explain the insufficiency of mere information. Behavioural economics sees humas as irrational since instead of following sensible information they behave in predictably irrational and biased ways, especially in quick decision-making situations. (Samson, 2015).

Shu et al. (2017) have combined motivational patterns of human behaviour for ecological products from psychological and sociological models. These patterns include values, beliefs and attitudes, personal and social norms, habits, capability, trust, and context conditions with opportunities, availability, constraints, and costs. Lockton's research team's (2013) analysis of green action-supporting solutions included themes about self-image, getting things done, seeing results, feeling normal, easing guilt, and getting rewards. The supportive solutions favour "social evidence": what peers do or recommend. The symbolic role of consumption connects to identity building with personal interests, such as improving health. Drivers for habit transition and barrier removals should be used when designing positive, long-term consumption solutions.

All of this is detectable in the social-cultural meaning of food entangled with celebrations, hospitality, symbolic or status meanings, and family and local identities. Traditions affect routines and everyday choices, so familiar and well-known food is experienced as pleasurable, safe, and tasty. Individual eating habits are persistent, like eating meat every day. People have health-related ideas and requirements, such as a sporty lifestyle connected to amble need for protein. Ethical and environmental concerns count in food choices, along with worries about animal welfare or nature protection. Finally, economic resources define purchases.

The multifaceted phenomena of eating highlight the importance of a multi-focus strategy to promote sustainable food consumption behaviours. This means research into consumer motivation, contexts, and activities and how consumers could notice and adapt low-impact solutions' new habit requirements. Besides concrete and detailed solutions, influencing consumption patterns and motivation for sustainable behaviour seems central.

Understanding the customer drivers can help design sustainable solutions that exploit interests, and can produce emotional design outcomes of desirability, joy, and affection. Individual and social-cultural drivers can deliver intangible, emotional, and cultural value to customers in addition to practical functionality. Appealing to people's desires for subjective well-being and self-expression can effectively encourage behavioural change rather than negative information. (Muratovsky, 2013). Sustainable offerings attract consumers when highlighting the individual relevance of the functions and benefits.

The psychology for behaviour change has compiled a COM-B model, a simple rule of favourable conditions to change behaviours and ensure crossing the main barriers. The model explains how the joint effect of capabilities, opportunities, and motivation enables behaviour change. (Michie et al., 2011). This model can be reflected to typical design solutions aims. The design tries to ensure ease of use and nurturing the feelings of ability in solutions (capabilities), offer affordances of doing things and acceptability socially (opportunities), and find drives for desirability, appropriating user's interests and providing meaningfulness (motivation). (Kälviäinen, 2022).

COM-B model can be exemplified with the questions for a vegetarian person. Through decades of author's experience, the most common question has been, isn't it difficult? This question of capabilities of not knowing how to cook vegetarian food can hinder motivation and opportunities. The younger generation of vegetarians often claim to hear the doubt if there is enough protein and the request of motivational certainty for the sufficiency of protein. It then moves to capabilities of choosing the protein-dense ingredients and thus to opportunities by provision.

The drivers for sustainability analysed from qualitative interviews with 76 Finnish consumers include support, interests, and obstacles with environmental choices that also reflect the COM-B model. The interviews examined environmentally responsible consumption through the intuitive grouping of 30 images. The images were selected from themes of green consumption in earlier consumer research. Participants depicted their associations, interests, actions, and obstacles in relation to green consumption through the images and their arrangement. (Kälviäinen, 2019).

The results demonstrated in Figure 2 suggest drawing attention to areas of direct or indirect consumer interests when making sustainable choices desirable. The results also highlight how communication should overcome the unclear and contradictory information challenges. Solutions should be easy to find and use. In addition, solutions should be socially acceptable and provide social activities. (Kälviäinen, 2022).

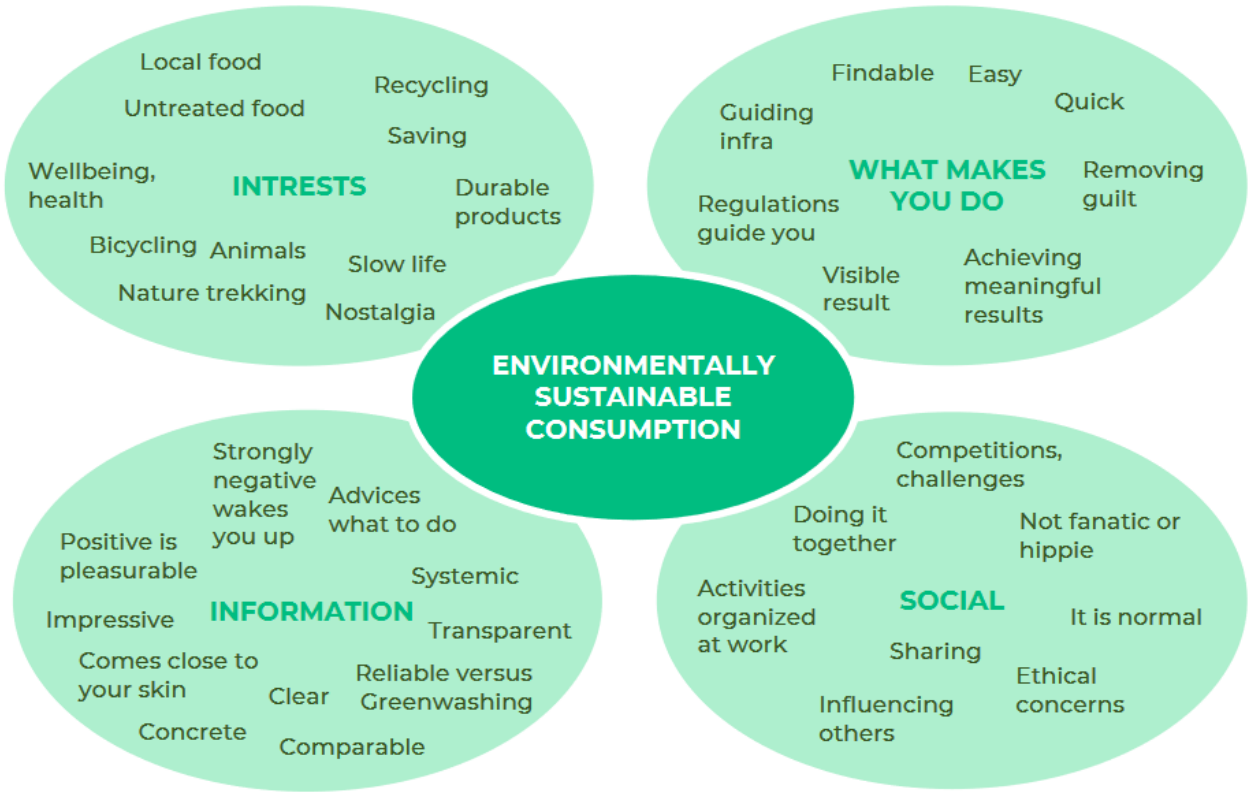

Figure 2. The drivers for solutions of environmentally low-impact consumption (Kälviäinen, 2022, 206).

Environmental performance is not at the top of consumers' minds among everyday pressures. For relevant value creation, sustainability can be indirectly added to consumers' interest in health, well-being, nostalgia, stressless living, nature trekking,

animal welfare, durable products, saving, and recycling. Information should be offered in clear, credible, and understandable ways. Comparisons to things that are familiar and understandable to the customer are helpful. Negative and impressive intimidation should be combined with advice on what you can do. Systemic concretizations help improve people's fragmented understanding.

In actual activities, the ease of finding things, accessing them, ensuring help and support for action, and clear visibility of the results provide support. The activities should help achieve tangible, meaningful results, provide rewards, and eliminate guilt. Guiding infrastructure and guiding regulations steer people but also provide social normality. Social interaction to support environmentally responsible behaviour includes sharing, challenges, competitions, and togetherness in your own circles of family, friends, or activities. Positive social responses support and reward behaviours but also produce happiness and satisfaction. The peer's willingness to activate others motivates as this is felt reliable and inviting.

These analysed drivers are backed up by similar research findings in a SHIFT meta-analysis, including social impact, habit formation, individual self, feelings and cognition, and tangibility (White & Habib, 2018). However, the drivers produced by the qualitative user research highlight not only the abstract SHIFT factors but describe some specific issues for customer influence in real solutions. All the themes from the drivers connect to food issues since food is embedded in our general structure of life, encompassing questions of health, well-being, caring for others, social life, knowledge level, time use, and monetary resources.

3. The Customer Food Journey analysis

Many behaviour change researchers have indicated a need for a process-based approach to tackle the transition. The approach for social-cultural sustainability should not be a one-off human-product interaction but solved as a real-life process (Kuijer, 2018).

In addition to sustainable behaviour drivers, the Finnish sustainable consumption research revealed a comprehensive picture of consumers' daily life constructed from busy activities and multiple pressures that related to family, working life, and free time activities setting requirements for time and money. The explaining narrative was that to perform sustainable choices and activities, people need supportive services that blend smoothly into everyday errands. The interests that motivate the initiation of the process should be considered. The solutions should not cause extra pressure but be easy to handle amongst the processes that fulfil the time and daily life. These service solutions should be accessible in the consumers' use context and at the suitable times for them. Their motivational information, and interactions should adapt to the multi-requirement constellations of everyday life. (Kälviäinen, 2022).

In service design, a service can be analysed as a customer journey covering the service process from the customer's perspective, including before the core service, during the core service, and after the core service phases. The journey is formed by service moments and interaction touchpoints and is facilitated with information channels, spatial service scape, and physical evidence of supportive products. The interaction in touchpoints pushes the service process forward. (Stickdorn et al., 2018).

The sustainable food consumption system can be analysed as a customer journey for behaviour change. The customer journey serves as an umbrella with a service style for the service moments and touchpoints where supportive factors steer the consumers toward the desired behaviour. The COM-B model from the previous chapter provides advice for service moments and touchpoints on how to ensure the necessary capabilities, motivations, and opportunities for behaviour change. As an application of a customer journey, a Customer Food Journey provides a multitude of possibilities for design since it holds a wide variety of service moments and touchpoint interactions. The practical Customer Food Journey moments can consist of the following ones:

Needs and wants for eating - planning what to eat - growing your own food - going to a restaurant or shopping for the food - delivery of the food - storing the food - cooking the food - eating the food - handling of the waste and leftovers.

These moments can overlap; alternatives and sub-moments exist, and the timespan can be short or several months when considering gardening. Typical Customer Food Journeys can be combined from the above moments. A need with social-cultural habits typically leads to food purchase planning and shopping, carrying the food home, and cooking it. Another kind of journey is activated when the need is fulfilled by eating in a restaurant. The different moments of Customer Food Journeys are carried out in different contexts and producer ecosystems.

At the beginning the consumers can be attracted by their interests, such as health, status, sociality, saving, or nostalgia. For consumers who enjoy spontaneous, impulsive shopping, designing the stimulus in shops is central. Different starting points and steering for change by place-based solutions are needed. Solutions must work in everyday haste, should dilute the feelings of conflict of information, and seem easy to execute. (Kälviäinen, 2022).

Solutions can be integrated to intertwined everyday activities. Austrian design students proposed an idea to combine commuting to work by train with an opportunity of ecological food shopping at the train station. Work-related mobility by public transport is linked to purchasing environmentally efficient food at a eco food store as an interlinked, by default sustainable food shopping system for the consumer (Kälviäinen, 2022).

The food needs and wants usually start the Customer Food Journey, coloured by the attitudes and social-cultural perceptions of food preferences and means to acquire or eat food. The eating needs are a kind of ongoing process occurring several times a day. The offering should interact with customer activities and places, and times the needs and wants for food occur. So easy discoverability and access to offerings is vital. Positive perceptions and social acceptability support making ecological choices.

In planning what to eat, the acquisition and adaptation of information, accessibility, ease of discovery and use, and social acceptability all play a role. Indirect interests as starting points for motivation support trying to change eating. Instead of scolding information campaigns, information that reaches people by connecting with their interests is appealing. Tackling the interest phenomena first is easier than solving the wholistic complexity of the Food Journey at once. (Kälviäinen, 2022).

One driver of consumer interest was nostalgia, which refers to “food prepared by grannies” or organic vegetables in recipes. Tradition-friendly meals from environmentally efficient ingredients attach the recipes to normality. A vegan challenge type of significant change is not necessary, as change can also start from feeling normal: seasonal food,

healthy food, clean food, or local and frugal food. (Kälviäinen, 2022). The planning phase already requires knowledge of recipes even when cooking is done further along the journey.

Since people tend to follow opinion leaders, celebrity influencers can be asked to offer information and recipes around environmentally sustainable eating in food-related shows and social media. Also, competitions are socially intriguing phenomena, and this human interest can be offered as a show to follow or as a possibility for participation. (Kälviäinen, 2022). Vegan challenges have had an impact in making people at least try ecological diets.

People have ceased to eat meat because of their interest in animal welfare, especially after seeing animal maltreatment (Kälviäinen, 2022). The comments about Finnish national food recommendations demonstrated meat-eating as an identity feature so social acceptability can be of support. Young lads have become enthusiastic about vegan food in Finland under the rough social media theme of Chips and Beer Vegans reflecting their identity.

The drivers of nostalgia and slow life are connected to the enthusiasm of growing your own food or harvesting it from nature. Gardening ensures your food is local and without poisonous substances. As a long-term effort, it is influential in promoting respect for food and taking food waste seriously. The solutions can also be social, as urban gardening often is. The timeline for growing food can be seasonal, but quick ways of growing edible ingredients also exist.

In addition to growing your own food, picking berries, mushrooms, or wild vegetables from nature is a form of acquiring food, together with fishing and hunting. These activities cherish knowledge of what you eat, offer relaxation from life pressures, and grow respect for food and nature. Picking food from garbage bins as an urban mining operation demonstrates how much edible food is thrown away.

In restaurant melas, the main question is selecting one, whether to eat there, for a take-away meal, or a delivery. The restaurants typically do not provide evidence of their portions' environmental or health impacts, excluding some dietary icons such as vegetarian leaves on menus. Interesting try-outs have emerged in the form of carbon dioxide emissions calculators for the ingredients to try out the impact of optional ingredients. These kinds of tools are educational since they improve the customers' knowledge of ingredients' ecological impacts. Restaurants have may opportunities to promote ecological choices with menu development.

Environmentally conscious eating habits can be spread in places that people frequently visit. The schools, universities, and work-related canteens are key actors in offering delicious sustainable food and promoting eating it. In Helsinki University Unicafe restaurants the abandonment of beef was estimated to reduce the carbon footprint by 11%, with accompanied efforts to increase vegetarian and vegan lunch sales by more than 50%. (Salomaa, 2019). The central producers of services can also be educational institutions and workplaces. An MA design project developed a challenge-based application for an existing start-up offering workplace eco-efficiency services. The pilot application consisted of an employee competition around choosing vegetarian choices for lunch.

In their shopping activities, some people plan carefully with specific recipes. Others get inspiration from the shop on what to purchase and prepare. With the latter, design can

increase knowledge and steer choice with food package information. In hasty grocery shopping, the customer does not have much time to concentrate on the product information, so easy-to-find environmentally conscious choices by product placement and general information in the shops are central. Shops can also offer suitable-sized food packages to avoid food waste. (Clune & Lockton, 2018).

Ordinary grocery stores are excellent places for influence because of their social normality. Many supermarket chains have tried to cover a vast stretch of the Customer Food Journey by offering eco-efficient recipes in their magazines and selling soon-to-age products at discounts. Ready-to-use food choices also represent an easy-to-use feature in the environmentally sustainable customer journey.

Online shopping engagement programs are influential, and they already offer carbon emission calculations from the customer purchases. A further step would be demonstrating alternatives for high-impact products and suggesting programs with default eco-choices. Consumer studies show evidence from comprehensive ecological food baskets as a viable option. Such models simplify and concretize the complex issue of environmentally efficient food choices. (Kälviäinen, 2022). How food is carried or delivered home also counts for environmental impact and services with optimized deliveries can reduce this impact. Packages of ecological ingredient with recipes can be a solution in a home delivery.

The storage facilities affect what you can purchase. The right way to store ingredients can be instructed, bearing in mind how to save energy. Nostalgic means, such as keeping food outdoors during the winter, could be re-appropriated to reduce energy consumption. Monitoring systems and optimizing the time-to-use the food at home is a means to avoid food waste.

The popularity of cooking offers many possibilities and influencers to instruct people about ecological choices. Being able and competent is a change-making requirement, so guidance on environmentally efficient cooking is particularly important. The recipes that people already use could be modified to replace high-impact ingredients with low-impact ones, like meat with vegetarian protein. Recipes should also include alternatives and compare environmental performance when using different ingredients. The portions of the recipes can include information on the environmental impacts. (Kälviäinen, 2022).

Eating can happen alone or with others. It can also be designed as an enjoyable experience around sustainable food. In eating, decreasing waste food is central. Behavioural psychology-based interventions can be helpful in preventing people from offering or taking too much food on their plates. Examples are small plate sizes or even leftover scales that work as vice-signalling devices.

The waste issue covers the amounts of food purchased and then left unused, the wasted ingredients during cooking, and the leftovers from meals. The waste problem is also connected to the increasing number of small households, contrary to the big food package sizes typical in supermarkets. The means to avoid waste can be good planning, reminder systems to use the purchased food, and advice on using leftover food. Food-sharing solutions have been piloted by different means, but they face challenges in hygiene and preservation. (Kälviäinen, 2022). The unusable food waste composting operations could be applied to complete the journey.

These Customer Food Journey moments describe the complexity of a food design for sustainable consumption and the multitude of possibilities to enable the consumer

transition. The possibilities increase when moving into the detailed service interaction touchpoints.

The design emphasizes a holistic review of user experience. The principles of behavioural psychology focus on individual decision-making interventions that lead to a change in identified key decisions, where decision support can steer behavioural changes (Bridgeable, 2018). In addition to caring about COM-B factors, understanding behaviour change psychology with triggers and nudges is helpful in service interaction design. The nudge theory has explored various ways to push actors gently into behavioural change. This may involve incentives, selection maps, default selections, avoiding errors, feedback, and simplification of choices. (Thaler & Sunstein, 2008; Shu et al., 2017; Bridgeable, 2018). The designer's efforts do not concern only the physical items, but various behavioural influences have a vital role in the transition concepts.

Psychology and behavioural economics are concerned about the impact of cognitive and emotional biases on human choices that work in quick and intuitive everyday reasoning. These point to the availability of an issue from memory, feelings and expectations in a decision-making situation, attention to something that is emphasized, attachment to the familiar, short-term impact considerations, pressures of social norms and groups, or pressures of reciprocity. These biases and their utilization also involve a lot of opportunities to influence behaviour as a so-called nudge. (Thaler & Sunstein, 2008; Samson, 2015). In a busy everyday life, issues of emotional importance attract attention. Sustainable consumption does not come first to mind, and the complex thinking it may require.

The psychological behaviour change-based heuristics can be applied to development tasks through using some of the ideation cards made from them. Some of the heuristics are more suitable for the customer journey's front end, such as framing the situation with customer interest and others work as rewards after activities have been completed (Kalviainen, 2021). An interaction may contain verbal and visual information or guidance for low-impact choice and use. The user can be strongly steered with feedback, rewards, penalties, or the reduction of alternatives or even forced functions. (Bhamra et al., 2011; Selvefors et al., 2011; Lilley et al., 2018).

Lockton (2018) instructs to study users' mental use situation patterns and knowledge of different systems and their components before influencing a single interaction point. These patterns guide the general experience but are also requirements for the use of psychological heuristics. Different touchpoints should also be carefully designed to prevent communicating in a hard-to-understand, greenwashing or fanatical way (Kälviäinen, 2022). The requirements of understanding and acceptability are also related to the services' overarching styles. These things need to be developed by participatory co-design and tested in real-life contexts.

4. Demonstrations of Customer Food Journeys in design cases

The framework of a sustainability-enabling customer journey that blends easily into everyday life and crosses the attitude-behaviour gap has been applied in several workshops and sustainable service design courses. The focus has often been on food design as a proposition on how to design sufficiency-based, strong sustainability. The framework applications on food design have taken place since year 2016 in Finland, Austria, and China with students and professional participants from around the world.

Many of the workshops lasted only a few hours or days. Mostly, the results have not reached the testing phase in real contexts, but framework learning has later led the participants to apply the framework in real-life projects.

The following is an analysis of concepts created in workshops that demonstrate the application of the customer journey-based behaviour change framework for Food Customer Journeys. The analysis and observations explain how to apply the proposed framework.

The short methods workshops have not allowed customer research; in longer ones, potential segment group representatives have been interviewed. However, the main service journey framework has been complemented with a trend analysis in the form of PESTEL (Political, Economic, Societal, Technological, Environmental, Legal) trends of different areas of society (Çitilci & Akbalık, 2020). This has been included as the purpose of design is to create future solutions. Societal trends include interesting consumption trends for food solutions, such as the increasing numbers of small families and elderly people in many Western countries. Healthy lifestyle aspirations, enthusiasm for culinary experiences, nostalgic traditionalism, needs for frugality and social media influence have provided frequent inspiration. The other areas of PESTEL have also brought some frames and inspiration for parts emphasized in the concepts.

The workshops were initiated by user persona creation or by using given personas from research-based sustainable consumer selection. This supported applying the framework focused on the customer's motivational interests, not on research-based eating recommendations. To cover the COM-B model's combination of capabilities, opportunities, and motivational customer journey aspects, the service moments should contain understanding about the customers' interests and aspirations and their know-how level and contextual situations.

The student's selected user personas have reflected their own life experience as adult students. There have been solutions evolved around the university run producer ecosystems of university-supermarkets-local producers. The university has been the promotor and co-operator for locally grown vegetables and other sustainable ingredients and recipes from them that are made accessible at the campus. One student user solution observed the students' loneliness and tackled the food challenges of small families and the young adults weak cooking skills through joint cooking and eating clubs to share the ingredients and learn how to cook sustainable food from different student cultures. The university was the organizing body because of its interest in improving the students' well-being and decreasing the organization's environmental impact. The university was also a credible collaborator with local grocery shops to provide reasonably priced ingredients.

The most common user persona chosen to represent the target customer was a male sports enthusiast or health struggler. This type was considered the most challenging segment to steer towards changing eating habits from high-protein meat eating to vegetarian eating. The central provider was set to be a public sector health program or a workplace. The sports and health have been seen as more compelling starting points than sustainable eating. The health and sports interest as the basis for the service made it easy to connect the information, and nudging to the gyms and sports clubs, or social media groups and influencers around exercise. Game-based activities and rewards have been a natural concept part to keep the change process active. These concepts managed also the challenge of initial customer motivation and identity support rather credibly. In more general family-related and frugality interests, it was not easy to find

sweet spots to get customers engaged with a new sustainable service so credibly.

The everyday joggling mothers who have the main duties of taking care of the family meals have also been common user personas in the concepts. This has often included a suburban environment and ecosystem of shops and delivery including an easy way to weekly plan, access, get delivered and prepare the healthy and sustainable family meals though recipe programs or clubs with possibilities for friendships. Even extreme personalization of the family preferences has been suggested through AI compiling family preferences and the sustainable food choices together. The concepts have also included vouchers and discounts for sustainable choices.

A specific support system concept to help family food planners add healthy and sustainable groceries to their food baskets included an efficient weekly shopping list and recipes using sustainable ingredients. The system supported choosing vegetables and less meat and gave new food options with a familiar twist. The support provided research-based facts and visualizations for ease of understanding. A combined meal planning and a shopping list included suggestions for changing or deleting unsustainable choices. It gave the family easy health and environmental impact calculations that supported food choices. The possibility of modifying the settings for family preferences was found to be important, along with the possibility to grade meals and ingredients and favour local products. (Kälviäinen, 2020).

The analysis compiling COM-B issues from different workshop concepts in figure 3, demonstrates how a general Customer Food Journey of attitudes, interests, needs, search, information, planning, accessing, conducting different food preparation activities, and having some kinds of rewards for good deeds is required. It was central that the overarching service umbrella of motivational interests and service style influenced how the information and interactions were designed and presented at different moments and touchpoints.

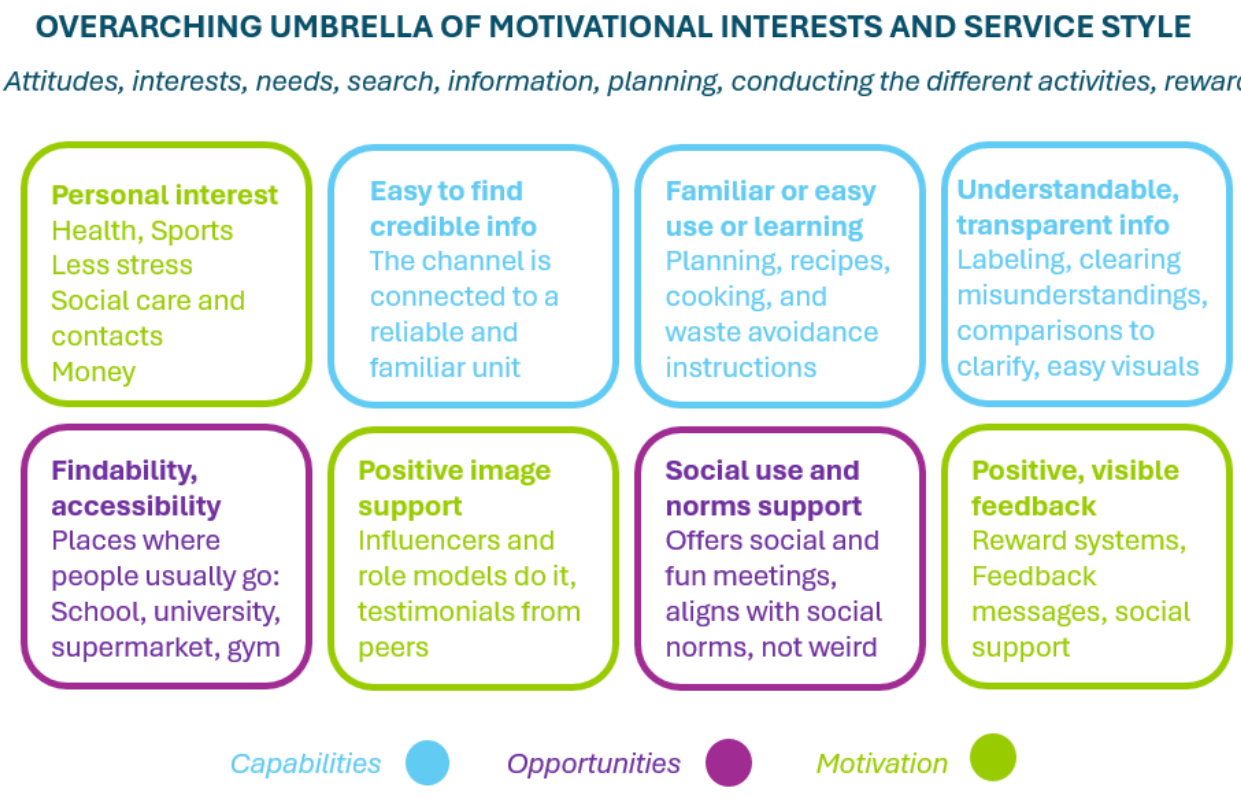

Figure 3. The drivers and aspirations inspired food journey features were collected from the food design workshop projects.

The customer-driven emphasis was initially more relevant than using the previous chapter's actual food service moments. In successful concepts, service moments and touchpoints for driving the journey forward and achieving the activity goals game after customer values, social-cultural aspirations, motivations, and their real-life contexts. If the work concentrated too early on concrete food-related activities and places, the concepts did not reach a convincing level of complexity and motivational stimulus. The combination of COM-B was lacking. The same happened when students from a product design background focused ideation quickly on packaging solutions and missed the behavioural transition focus around food.

An example of a credible food journey-based rather than user-based solution was a bug protein concept that included a peer support interest group in social media built around growing bugs yourself. It was promoted by people's pet care enthusiasm, by local food truck tastings, and by a social influencer using insect granola. The possible disgust was avoided by knowing where the bugs came from and what they had eaten. Packaging was unnecessary other than the kits for growing the bugs. The bug-based protein was promoted as protein for fitness and health. (Kälviäinen, 2020). A similar healthy protein concept promoted fungi protein and created a customer journey for nudging to use mushrooms as important, protein ingredient for meals. Another nice food journey solution was a farm collaborating with school so that the children would participate in farming and have more respect for food. The self-grown vegetables were then prepared in the school kitchen engaging the children to experience how food could be made from them.

The recommended use of the framework for Customer Food Journey concentrates first on the interest drivers for the customer segment and gradually builds the activity type of Customer Food Journey service moments in iteration with the aspirational side. The following detailed design of interactive touchpoints utilizes social-cultural drivers and psychological heuristics to ensure the hoped-for behaviour change. Customer journeys were built to inform, persuade, and support consumers to make selected food consumption changes through social, habit-based, identity-related, emotional, and tangibility-based promotion. Only further along the process is it necessary to consider whether the sustainable change would also require changes in the physical evidence, such as packaging solutions.

The solutions often required a provision ecosystem that could be public sector, university, association, workplace or business centred rather than a single business. Covering the long Customer Food Journey can include many actors and ecosystems and has much detailed design potential. The developed concepts have concentrated on some parts of the journey as sensible concepts. Even a service of few service moments involves many stakeholders and ecosystems of provision, which need to be integrated into customers' decision-making and activity contexts. The information and steering should be available from workplaces, interest-related programs, hobby circles, organizations, or consumer influencers genuinely interesting and credible to the segment group. The providers and stakeholder networks were also specifically asked to be analysed when making the concept suggestions.

The workshop participants who went further in the detailed design also used behavioural heuristics for the touchpoint ideation and design. Typical use was framing the offering as healthy instead of only sustainable. Sustainable choices could be highlighted, recommended by credible influencers, presented as a favourite for many customers, even hidden under a popular food trend, or made to appear rare and valuable. Feedback, discounts, bonuses, and reminders were also applied. The design-professional

background could also hinder the participants in using the heuristics since they settled for eco-labels or visual advertisements without nudging behaviour content. Even if concretization is important, it should perform a task and not suffice with a nice look or hint of greenwashing.

5. Conclusions

The role of design for food transition is relevant, as can be demonstrated by the multitude of service moments on a Consumer Food Journey that allow the design for capabilities, opportunities, and motivation enhancing service moments and enabling touchpoint interactions. Design of physical evidence in service touchpoints is still needed, but these should follow the aspirational, interest-based transition concept that motivates customers with an appreciation of their social-cultural eating habit aspects. The application of the service-based framework does not implicate big divergent-convergent thinking variation, but the interaction of different framings as abductive reasoning explained by Castanho et al. (2024) is vital as means for food design thinking. A solution can be created by iterative framing of aspirations and drivers, nutrition recommendations, Customer Food Journey and COM-B model, and the heuristics of behaviour change to gradually specify a transition journey.

Provision stakeholders and service ecosystems are also important to consider when creating services. Different stakeholders, as providers, change the activity journey. This is also true if the target customer is changed. For all these initial considerations of the service journey, it is not advisable to dash straight into designing an activity-based Customer Food Journey such as planning, shopping, and cooking a meal.

Behaviour change does not happen only by designing a sensible, sustainable customer journey with food consumption activities. Integrating such behavioural theories as the COM-B model with the customer journey and applying the behavioural psychology heuristics help designers ensure the necessary steering for the customer transition. Behavioural heuristics use the learnings from bounded rationality in human decision-making, which marks the way we conduct food decisions and behaviours in the middle of busy everyday life. The behaviour change theories and heuristics remind to design for change in eating or other habits instead of just designing for brands, service activities, spaces, or products. As a customer-driven design input, the Customer Food Journey does not need interventions as only activities; it requires content, feel, and channels that influence how the nudge works.

The Customer Food Journey solutions can be produced and applied to transition purposes by public organizations and businesses, even 3rd sector actors. The solutions often require a network of producers since even a short process of service moments requires several provider participants. Many educational organizations and workplaces try to decrease the environmental impact of the people in their activities, so they can also be the central actors of food transition solutions. Besides a low environmental footprint of production, a handprint increase is required, allowing less impact on solutions' consumption and leading businesses and organizations to improve their calculated net impact results (e.g., Upright Project). This is not a measure to be achieved by the provision part only, but to function; it requires consumption behaviour change.

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Fermento: Food Fermentation as a Catalyst of Cultural and Ecological Consciousness

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ABSTRACT Industrialization has significantly changed the connection between humans and nature, leading to concerns about losing this relationship, particularly in urban settings. Termed the 'Extinction of Experience,' this disconnection has been linked to higher rates of poor personal and neighborhood well-being.
We studied Asian food culture through literature reviews and field research and identified cultural attitudes toward the microbial world.
The research methodology, in addition to literature reviews, field trips, and interviews, involved a workshop on rice fermentation, which we intend to develop further as a research method.
The rice wine fermentation workshop involved four inexpert individuals who had never tried or considered fermentation practices. The workshop was followed by interviews. Participants acknowledged a deepened understanding of fermentation, recognizing an eye-opener on their relationship with the invisible microbiome and, thus, the environment.
The research concludes with the design and prototype of a contemporary fermentation toolkit. Fermento is designed to foster handmade and natural food practices. The main innovation is championing engagement by dynamically visualizing and controlling the fermentation process, aiming to enhance accessibility and comprehension of this transformative culinary art.

KEYWORDS | Fermentation, Microbial Symbiosis, Workshop, Culinary Innovation

1. Introduction

From primitive societies to the advent of the industrial era, civilization gradually led to exploitation and alienation from nature. Despite humanity's tremendous progress and efficiency, we have increasingly less contact with nature, as if it is becoming less relevant.
The food industry, as part of the social industrial framework, has altered traditional methods of food production. However, traditional fermentation practices still persist in many Chinese households. Through fermentation, we unconsciously continue to establish a connection with the unseen world through microorganisms and food materials. What if we could make this connection noticed and aware? Fermentation becomes a potential bridge between humans and nature.
This project encourages people to reestablish a complex relationship between humans and nature by producing and consuming fermented foods. In our social settings, we express ourselves through language, receiving signals from others through auditory and visual senses. During fermentation practices, we cooperate with microorganisms, who send us messages through smell and taste; thus, we generate a true moment of coexistence and openness to embrace natural agency in our intentional design.
In silence, fermentation rebuilds the long-forgotten connection with nature, echoing our undervalued communication with the natural world.

2. Literature review

2.1. Industrialization, Environmentalism, and Sustainable Design

The post-WWII industrial expansion triggered unprecedented urban growth at nature's expense, prompting a global reckoning with anthropocentrism. *Silent Spring* (Carson, 1962) catalyzed the deep ecology movement, advocating biocentric equality in ecosystems (Sessions, 1987). This philosophy influenced design practices, with "green design" emerging in the 1980s as European nations prioritized eco-conscious production (Madge, 1997). By the 1990s, sustainable design evolved into a commercialized framework emphasizing equity and participatory decision-making (Griese et al., 2005). It is notably highlighted that global consumption patterns would dominate future ecological discourse, marking the transition from radical green design to mainstream sustainable solutions (Adams et al., 1991).

2.2. Urbanization and the Extinction of Experience

Rapid urbanization–exemplified by China's urban population surge from 17.9% (1978) to 65.2% (2022)–has severed human-nature connections (生态环境部环境与经济政策研究中心, 2023). Termed the "extinction of experience" (Miller, 2005), this disconnection reduces ecological awareness and exacerbates health issues like depression and obesity (Colléony et al., 2020). Samways (2007) warns that urban environments risk permanent alienation from nature, necessitating interventions to restore ecological engagement for both well-being and environmental stewardship.

2.3. Food Industrialization, Chemical Gaze, and the Dilemma of Chinese Food Industry

Even though designers, ecologists, and people from other backgrounds have put a lot of Industrial food systems prioritize efficiency over ecological engagement, replacing traditional practices with standardized production. Landecker (2019) defines this shift as the "chemical gaze"–a perceptual framework reducing food to biochemical utility, exemplified by industrialized societies' fixation on nutrients over ecological context. This detachment obscures humanity's role in natural cycles, deepening the extinction of experience. In China, where agrarian traditions emphasized seasonal harmony, younger generations now adopt the "chemical gaze," viewing food through industrial metrics rather than ecological interconnectedness.

To counter this divide, fermentation emerges as a cultural-ecological bridge. As Chaberski (2020) argues, microbial processes like fermentation exemplify "performativity beyond human agency", challenging industrial paradigms. China's ancient fermentation practices–integral to soy sauces, pickles, and alcoholic brews–embody a synergy between humans, microorganisms, and environment. Reviving such traditions could mitigate the extinction of experience by reembedding food practices within ecological cycles.

3. Rice Wine Exploration

3.1. Cultural Respect Towards Food Fermentation

The research started with fieldwork in local food industries in a small town near Nanchang City, Jiangxi Province, China.

The first field trip was to a tofu workshop in February.

Figure 1. People working in Fan's Tofu Shop. It was near Chinese New Year, and the family gathered to prepare for the coming festival. Photo by Hongyi Hu on Feb. 3rd, 2024.

Fan's family runs the Tofu Shop. Started by Fan's parents, the shop has a history of over 30 years. During Chinese New Year, every family member must participate in the production of tofu and many other bean products, including Fan's children.

The family makes moldy tofu as a gift for the relatives who visit them during the Chinese New Year. The process takes around a week. After a batch of tofu is made, Fan puts it in a ventilated dark room, covering it with a piece of gauze for five days. After the tofu gets moldy, the family gets together to cover each block of tofu with seasoning powder and jar it.

Figure 2. The process of making a batch of moldy tofu. Photo by the researcher on Feb. 3rd, 2024.

During the process, the family fills the tofu workshop with laughter and chitchat. Tofu making is the family's support and, as every member joins the production process, it has also deepened the connection between different family members and friends.

Two weeks later, the researcher traveled to a Chinese white wine factory in town. The wine factory is named after the town and is famous for its long history. The comments about the wine it produces are quite controversial, as people argue that the wine does not meet their expectations for a wine factory with such a long history.

Figure 3. A well from the Ming dynasty (1368 – 1644 A.D.) excavated at the Lidu Wine Factory. Photo by Hongyi Hu on Feb. 17th, 2024.

The wine factory offers a tour around the relics of the ancient factory. The factory built a new factory near the relics, and the tourists are allowed to watch the staff prepare wine fermentation.

Figure 4. Workers cooling the well-done wheat for white wine fermentation at the Lidu Wine Factory. Photo by Hongyi Hu on

The ancient history of the factory is the key element in its branding. The factory claims to have the most ancient wine fermentation culture in China. Many tourists visit the factory every year to experience its famous history.

3.2. Rice Wine Fermentation Practice

After the field trips' observations, the researcher started to practice and considered how to connect fermentation with contemporary daily life. During this process, the researcher started fermenting rice wine.

Rice wine is one of the most common foods in Southern China. It has a history of over 3,000 years. Many make rice wine fermentation as a family tradition. One of the researcher's family members has a lot of experience in wine fermentation, which benefits our project.

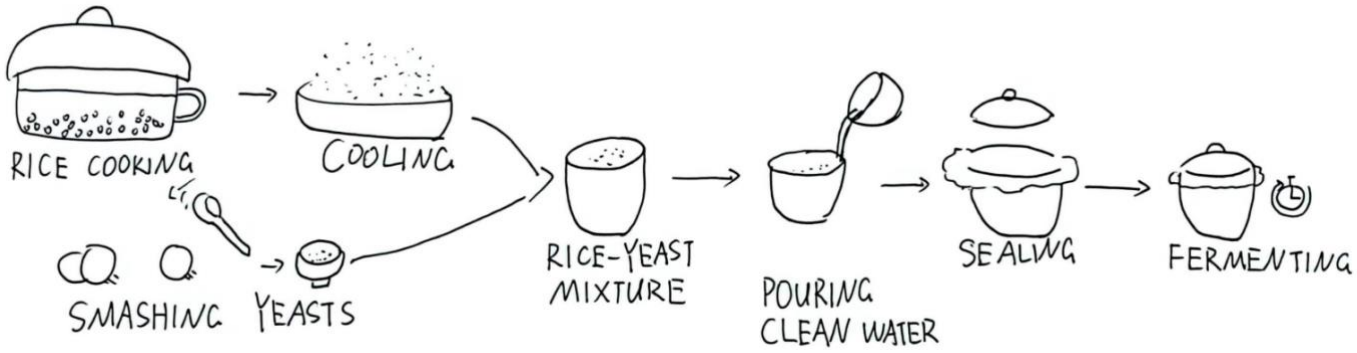

Figure 5. Notes on how to make rice wine fermentation.

Rice wine fermentation is relatively easy to practice, and the food for fermentation is relatively easy to purchase locally.

Figure 6. Rice wine fermentation practice. Taken on Jan. 14th, 2024.

Figure 7. Rice wine fermentation record. Taken on Jan. 17th, 2024.

Due to the widespread cultural resonance and accessibility of rice wine fermentation, we consider it an applicable practice for the majority to join food fermentation and potentially rebuild their connection with nature.

3.3. Workshop and Documentations

After the field trips and the practice, the researcher decided to carry out the process with more people. We aimed to get more people involved in the practice of food fermentation and observe whether this could help rebuild their connections with the surroundings and nature. To do so, we set up a call for a rice wine fermentation workshop, getting some design students involved in making rice wine fermentation and having a taste of each other's production. Each participant would be asked to sign an informed consent form before the workshop, acknowledging that the workshop process will be recorded and used in related publications.

Four participants who had no experience in fermentation work volunteered to join the workshop. Participants were instructed to mix rice with smashed yeasts and seal them carefully. After the fermentation, they gathered again to taste each other's rice wine.

Figure 8. Rice wine workshop. Participants seal the rice and water with yeast. Photo by Amedeo Martines.

During the workshop, another ongoing experiment took place. The researcher collected the microbial samples from the participants' hands twice: once before the workshop and again after. Then, the researcher smeared the samples from each individual into two different Petri dishes, culturing them in sealed environments.

Figure 9. Collecting participants' hand microbiomes. Photo by Amedeo Martines.

The microbial samples were cultured in a warm environment for 5 days, the same duration as the rice wine fermentation.

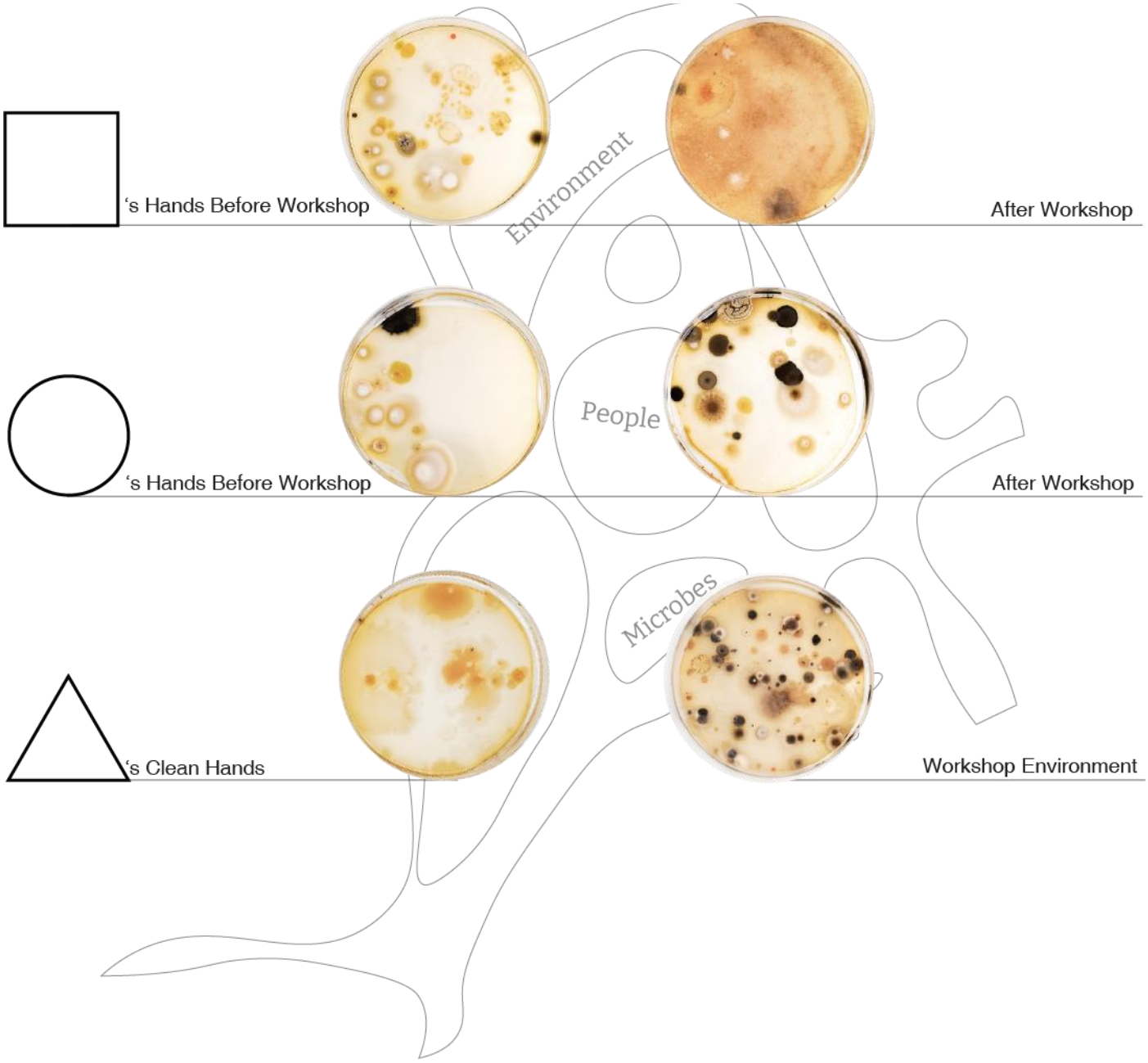

Figure 10. Samples of the participant's hand microbiomes before and after the workshop, each geometry representing one participant. The workshop environment microbiomes are for comparison.

Pictures of these samples were shown to each participant during the next research stage.

3.4. Interviews and Feedback

We conducted one-to-one interviews under the guidance of *Trial Implementation of the Review Method for Scientific and Technological Ethics* (《科技伦理审查办法(试行)》). Three participants agreed to the interviews, and one did not for personal reasons.

All three participants expressed their excitement toward fermentation activities. Two of the participants said it recalled their childhood memories with family.

> "When I was little, my grandmother used to ask me to help her make plum wine. I found it too troublesome and didn't want to get involved." (Participant △)

> “My dad was obsessed with wine making. When I was younger, he would ask me to help him with odd jobs, but I didn't find it enjoyable… But this time, I experienced the fun! I hope to do it again myself. ” (Participant ○)

Speaking of the experience from the workshop, they also showed positive attitudes toward such group activities.

> “I could remember the sticky feeling of rice. I don't like it. My wine also didn't taste as good as I imagined… But what's impressive is the atmosphere when we were all together chatting and messing around while making. ” (Participant □)

> “I realized the food fermentation was never boring. Making wine with friends and family, old and new acquaintances are perfect for a get-together. ” (Participant △)

Another new perspective from the interview is their new connection with their environment. This is brought up after the participants are shown their microbiome samples during the workshop.

> "When I saw the bacteria from my hand in the petri dish, it felt amazing. I never realized that there were so many of them in my surroundings that I had been overlooking. It strikes me to feel the wine tastes better after seeing this.” (Participant □)

> "It's fun to watch these patterns on the petri dish. I don't know much about wine fermentation, but these indicating patterns really helped me connect with those 5 days of fermentation. Shame that I could not see the process.” (Participant ○)

The workshop revealed that participatory fermentation reconnects personal heritage through nostalgic engagement while fostering ecological awareness via microbial visualization. Participants' critiques of process invisibility highlighted a critical gap in conventional practices, emphasizing the need for real-time feedback systems. These insights directly inform future design priorities:

- Translating microbial metabolic rhythms into perceivable information;
- Building accessibility of fermentation activities;

By addressing the tension between microbial agency and human legibility, this research lays groundwork for interventions that transforms passive consumption into active ecological participation.

4. Design Concept and Implementation

4.1. Key Findings

From the workshop and interviews, the main author has summarized two main findings that have driven the design of a fermentation toolkit for bridging contemporary lifestyle to nature through food culture and practices.
The first discovery is that we can make the fermentation process more accessible and engaging through design; and the second point is that we can leverage the microbial

process visualization as the most powerful strategy to raise interest, awarness, and, thus change attitude towards handmade food making.

4.2. Form Exploration

The design development has been informed by the workshop environment and the traditional toolkit for rice wine fermentation.

Figure 11. The space of the workshop is crowded with people and tools. Photo by Amedeo Martines.

Figure 12. A collection of Chinese traditional rice wine fermentation tools.

The idea was to recreate by design circumstances similar to the workshop's environment, where multiple individuals are involved in the fermentation activity. Thus, we designed a work station that allow more people to cooperate in the process.

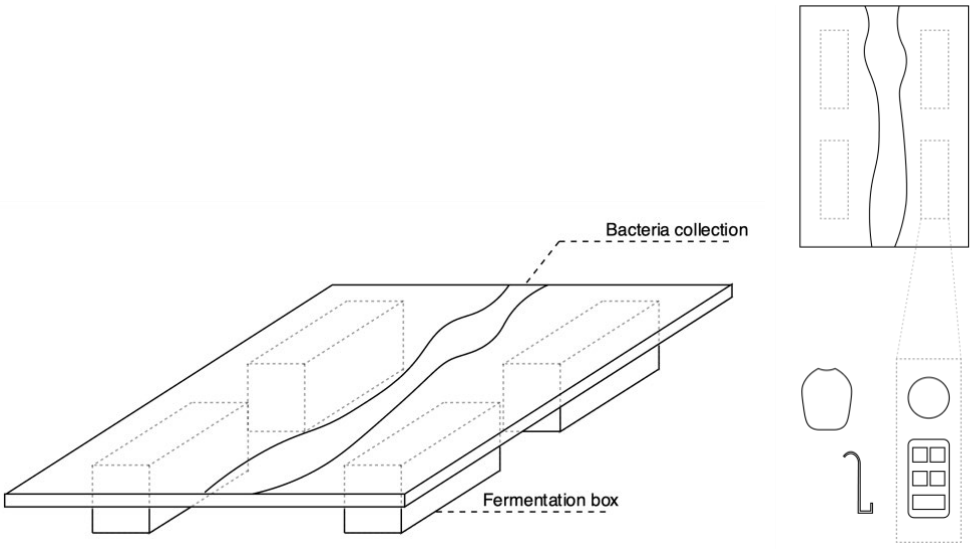

Figure 13. Drafts of form exploration.

After design iterations and reflections, we realized that this option would remain purely speculative and would not find a demand, given the conditions and size required by this option. We intended to make a real impact with our project, which could align with a broad audience interests and accessibility.

4.3. Design Proposal

To revolve around the concept of accessibility and visualization of microbiome, we proposed a series of tools that align with the function of rice wine fermentation, which could also be applied to other food fermentation production.

Figure 14. Design form of Fermento.

The design form of the project consists with two main parts: the wooden platform and the visualizing tools.

The wooden platform is a multifunctional workstation for fermentation production and tool keeping. The embedded heater maintains optimal temperature ranges (25-30°C) for microbial metabolism. The drawer can keep the tools in a sanitary environment.

The visualizing fermentation tools are a microbial activity monitoring and visualizing system. The fermentation monitor, consisting of CO2 sensor and humidity-temperature sensor, is integrated with the stopper. The data is collected at 30-second intervals, and transmitted to the visualizer via Bluetooth. The visualizer processes the data, and displays the microbial activities during fermentation. The visualization is inspired by the records of microbial patterns on the petri dishes. As the fermentation, the visualizer is gradually crowded with multiple circles in deepening colors that slowly move around.

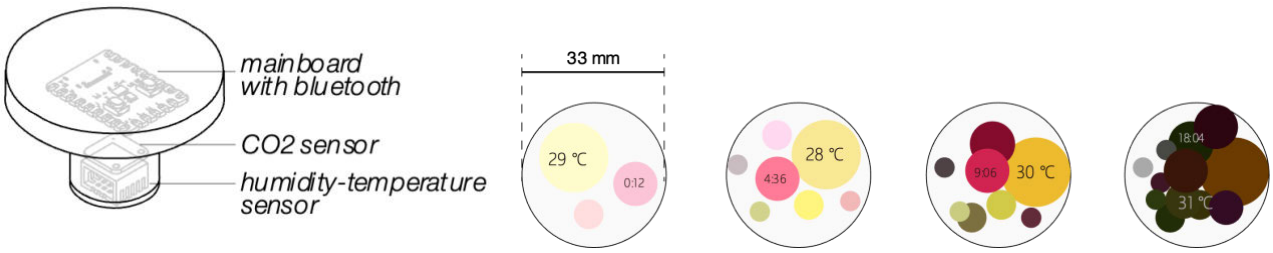

Figure 15&16. Monitoring stopper structure & Visualization of fermentation on the screen.

The visualizer can be placed in different parts of the product. It can be placed on the platform while users are preparing for fermentation, on the monitoring stopper while fermentation is happening, or in a daily scenario where the user is in their routine.

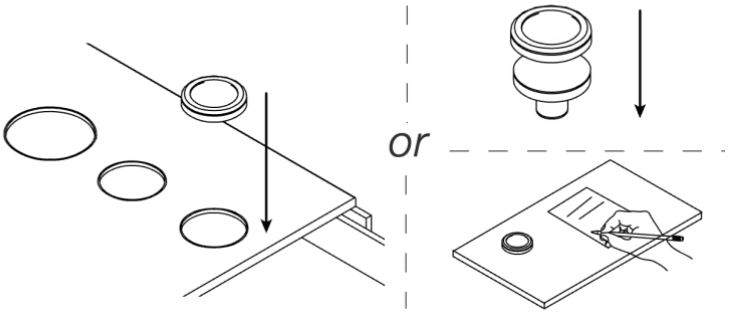

Figure 17. Usage scenario of the screen visualizer. User can put the screen in their home during daily activities.

Another detail was constructed via the observation of the gas pressure in the sealing bottle. After the workshop activity, 3 of the participants sealed their rice wine in a glass bottle, and placed them in a fridge. However, all of the stoppers of the bottles popped out because of the gas pressure caused by the non-stop fermentation process.

Figure 18. Stoppers pop out of the bottle because the fermentation process produces a large number of carbon dioxide.

Inspired by this incident, the design introduces the mechanism of stopper locking, and uses pressure sensor to detect and indicate the process of fermentation.

Figure 19 & 20. Mechanism of the light indicator of the fermentation process. The stopper manages to hold the gas pressure inside the sealing bottle. When the gas pressure reaches 2 atm, the LED ring around the stopper will light up to indicate that the rice wine requires degassing and the expiration date should be checked.

Figure 21. The jar can also be integrated with the stopper to monitor the fermentation process.

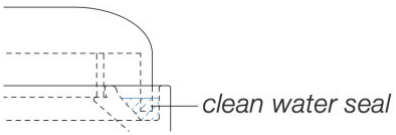

Figure 22. The jar uses the water-seal method to increase its accessibility with simple steps.

The prototype of the design is due to carry out in the near future, followed by a series of user tests.

5. Conclusion

This study proposes fermentation as a vital mediator in rekindling the fractured relationship between humans and nature within industrialized societies. By framing the Extinction of Experience (Miller, 2005; Colléony et al., 2020) as both an ecological and cultural crisis, the research demonstrates how traditional fermentation practices—embodied in rituals like moldy tofu preparation and rice wine-making—serve as embodied, multisensory pathways to reconnect individuals with microbial ecosystems and broader ecological cycles. Through participatory workshops and ethnographic fieldwork, we revealed that hands-on fermentation fosters not only technical knowledge but also a relational awareness of humanity's symbiotic interdependence with microorganisms—a perspective often obscured by industrial food systems.

The design of Fermento operationalizes these insights, translating ancestral fermentation wisdom into a contemporary toolkit that democratizes access to practices based on microbial collaboration. By integrating real-time sensors (CO_2, humidity, temperature) and dynamic visualization interfaces, Fermento bridges the epistemic gap between invisible microbial processes and human agency, enabling users to "dialogue" with fermentation ecosystems. Participant feedback underscored the toolkit's potential to transform fermentation from a passive consumption act into an active, community-centered practice that reconnects individuals with seasonal rhythms, familial traditions, and localized ecologies—echoing the Slow Food movement's ethos (Chrzan, 2004) while

advancing Green Design's participatory imperatives (Madge, 1997).

Theoretically, this work contributes to deep ecology discourse by reframing microbial symbiosis as a site of ecological consciousness. Practically, it challenges industrialized food systems by proposing fermentative re-engagement as a counter-narrative to standardized, disembedded consumption. To overcome the limitations of this study, which are 1) the small workshop cohort and 2) the cultural specificity of case studies (e.g., Jiangxi Province's tofu and wine traditions) we are planning a broader cross-cultural validation. Future research could explore scaling Fermento into decentralized community networks or integrating its principles into urban sustainability curricula.

To summarize, this project posits that fermentation—as both metaphor and practice—can reanimate our atrophied ecological sensibilities. By rendering the microbial world legible and actionable, Fermento invites users to reclaim agency in a more-than-human dialogue, nurturing what Thoreau (1854) termed a "conscious striving toward harmony with nature." In an era of climate urgency, such tactile, culturally rooted interventions may prove to be critical in cultivating the ecological literacy and empathy needed to reimagine humanity's place within planetary systems.

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Hongyi Hu, BEng degree in Industrial Design from Southern University of Science and Technology (SUSTech), School of Design, is a visiting student at *Materialities Research Group*. His research aims to intervene in food fermentation and culture through design.

Enza Migliore is a researcher and educator in design, focusing on materials exploration through interdisciplinary and empirical practices. She holds a Ph.D. in Design and Innovation and is recipient of a Post-Doctoral Research fellowship by Japan Society for Promotion of Science.

She is an Assistant Professor at the SUSTech, School of Design, leading the Materialities Research Group.

Acknowledgements: From Hongyi: I would like to express my gratitude to my supervisor Enza Migliore and her great team, who have been generously offering help to me. I would like to thank Amedeo Martines, who taught and helped me a lot about photo shooting, post-production, and offered me advice on prototyping. And I would like to thank everyone who helped inspire me in every way they could.

ethical leadership
a new frontier for design

How graphic design on packaging can facilitate the adoption of sustainable food products? The case of insect-based cereal bars.

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Valérie Hémar-Nicolas, University of Paris Saclay, France
Thelma Lucchese-Cheung, Federal University of Mato Grosso do Sul, Brasil
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1. CONTEXT

Urgent need **to find alternative proteins** to protect the planet and our health (Thavamani *et al.*, 2020).
Insects offer nutritional and environmental benefits, reduce food production costs (Van Huis *et al.*, 2013)
BUT insects are considered **non-edible in Western cultures** (Kröger *et al.,* 2022)
Perceived sensory attributes in insects **strongly increase disgust and reduce their willingness to taste** them (Gallen *et al.,* 2019).

2. PURPOSE

Packaging design is a critical tool to overcome these barriers.
This research focuses on **how to best visually represent an insect on the front of the package** to **reduce disgust** and improve **the expected taste** of the insect-based product.

How does the type of insect drawing on the packaging influence consumers' perception?

3. WHAT WE KNOW FROM PREVIOUS RESEARCH

Mealworm in photo
on cereal bar packaging

Mealworm in drawing

More psychological distance
Less perceived disgust
More expected taste
... than photo

Hémar-Nicolas et al. (2024)

THEORETICAL FRAMEWORK: CROSS-MODALITY THEORY (ELDER AND KRISHNA, 2022)

Graphic design → **Mental representations** (embodied mental simulation) → **Sensory inferences** (taste, flavour, mouthfeel) **Anticipated emotions** (disgust) → **Attitudes and intentions towards the insect-based product**

4. Hypothesis

Visual shape (round vs angular)
Insect type (mealworm vs scarab)

→

Attitude towards packaging
Attitude towards insect drawing
Mental imagery
Anticipated taste liking
Expected orosensory attributes
(sweet, salty, bitter, sour, crispy, sticky)
Perceived edibility
Perceived risk
Perceived disgust
Curiosity towards the product
Perceived healthiness
Perceived environmental benefits

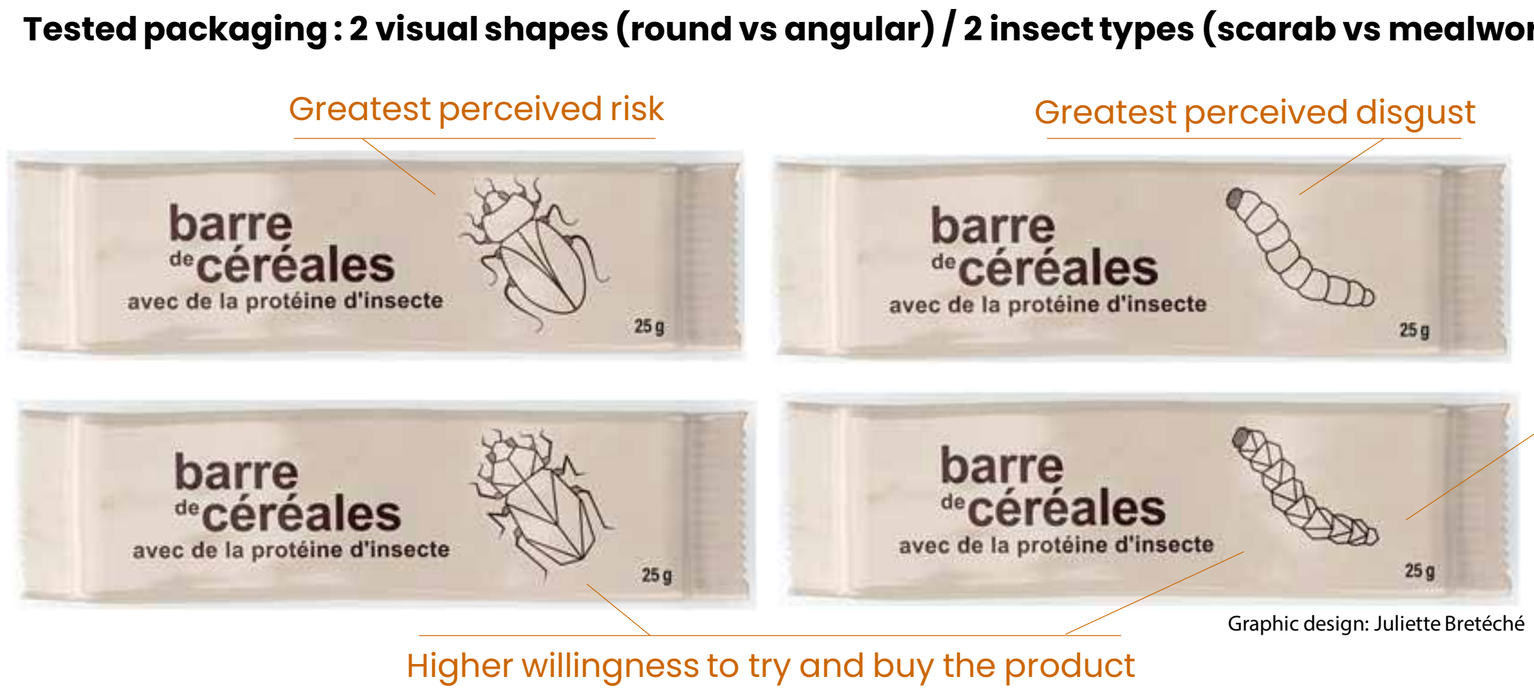
→ **Attitude towards Product** → **Willingness to taste** + **Purchase intention**

5. METHODOLOGY AND RESULTS

Quantitative study
N=1415 consumers
(FR – BR – FN)

Full Factorial Design method and analysis of variance (ANOVA).
Analyse: effect of two factors (2 visual shapes and 2 types of insects - 2 x 2) on the continuous dependent variable (7-point likert scales).
Means compared between groups.

Tested packaging : 2 visual shapes (round vs angular) / 2 insect types (scarab vs mealworm)



Graphic design: Juliette Bretéché

6. IMPLICATIONS FOR RESEARCHERS AND DESIGNERS

Correspondence between the shape of a food's graphic design on the packaging and its perceived taste (Cross Modality Theory, Elder and Krishna, 2014, 2022): graphic design on the packaging generates the formation of mental representations in the consumer's brain, sensory inferences (taste, flavour, mouthfeel) and anticipated emotions (disgust) associated with the product, which in turn influence attitudes and intentions towards the product. **It has been shown that a round shape is associated with an expected sweet taste**.
For insect bars: angular shapes are the most accepted. **Angular mealworm is preferred** (to the scarab) **and perceived to be sweet and the crunchiest in all three countries**.

It's in designers' interest to represent the insect as a larva (without head, wings and legs), and with angular shapes (vs round) to promote acceptance of insects based-food.

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LET'S (EXPERIENCE) DESIGN EATING HORSE!

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ABSTRACT | Imagine entering a restaurant. But something is off.. It is cold, the light is too bright. The atmosphere is eerie. You have entered through a plastic strip curtain into a narrow corridor leading to a small, sterile kitchen with white, cold tiles and strip lighting.

You look around and open a door. Yes, it is in fact a restaurant. Different seating arrangements fill the open space accompanied by chandeliers hanging from the ceiling. Except the candle lights are dimmed. Upon a closer look you see that the candles are replaced by serving tongs that hold minded-meat hot dogs. You slowly walk around. You take a chair from the table and position yourself to sit down. However, you have never seen a chair like this before. It mirrors the shape of a horse saddle. Once you have awkwardly placed your legs on both sides of the saddle chair, a man in a white, blood-stained butcher's apron enters the room and serves you a piece of meat, "enjoy your meal" and walks away.

Welcome to Fat Pony!

Fat Pony is a quintessential example of Experience Design. Everything within Fat Pony, from the butcher's kitchen to the chairs to the manner of serving has been specifically designed to prompt the audience to examine ethical questions around our consumption in general, and the consumption of horsemeat in particular. Why do we consume what we consume? Who leads us to believe that what we consume is normal? Can we trust those? Does it feel comfortable? By offering such a thought-provoking dining experience that triggers the audience's reflections, emotions and interactions, Fat Pony serves to initiate and facilitate debates on societal issues in which ethics plays a significant role.

By offering a vital opportunity to engage with issues of transparency, trust, and social responsibility, Experience Design is the optimal medium for designers to display ethical leadership. By completely immersing the visitors in the experience and subjecting them to a range of feelings and emotions, it has the power to alter ethically questionable narratives that have been normalized in society and accordingly create a lasting impact, not only on individuals but also throughout society writ large. After all, has the consumption of horse meat by now become something we no longer 'just' accept?

This is where the crucial role of Experience Design comes in to trigger societal change. By continuously exploring how to move an audience and influence one's state of mind and behavior, designers not only leverage Experience Design for trivial public engagement but direct their visitors towards ethical and resilient societies and as such manifest themselves as ethical leaders.

KEYWORDS | EXPERIENCE DESIGN, ETHICS, ETHICAL LEADERSHIP, MULTI-DISCIPLINARY, SUSTAINABLE

Figure 1. Visiting a local butcher shop as part of the preliminary investigation.

Figure 2. Entering the restaurant via a cold room strip curtain and through a narrow corridor in the designed small kitchen.

Figure 3. Sitting on horse chairs, eating horse meat, at one of the hoofed tables. In the background left a photo of the design process, investigating sitting positions reminiscent of sitting on a horse.

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MOBILE KITCHENS IN DESIGN EDUCATION: A SITE FOR NEW MODELS OF MAKING AND GATHERING

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ABSTRACT | This paper examines the role of mobile kitchens in design education, highlighting their potential as innovative pedagogical tools for community building, material exploration, and sustainability. Through three case studies across North American institutions, the research investigates the impact of mobile kitchens as spaces for collaborative learning and social engagement. These kitchens, developed organically over six years, support activities like food-based workshops, biomaterial experiments, and community meals sourced from local, community-supported agriculture.

The mobile kitchens serve as platforms for addressing social issues such as food insecurity and climate crisis, allowing students to explore food as a material for design and communication. Each iteration of the mobile kitchen was co-designed to meet the specific needs of its institution, promoting cross-disciplinary collaboration and hands-on learning. The study also examines how these mobile units facilitate connection and dialogue outside traditional classroom settings, fostering a sense of community and cultural sustainability. We argue that mobile kitchens in design education are more than just functional tools; they represent a shift towards experiential, community-focused learning, where food, design, and social practice intersect to address pressing global challenges and directly engage students with real-world issues.

KEYWORDS | FOOD DESIGN, MOBILE KITCHEN, DESIGN EDUCATION, COMMUNITY WELL-BEING

1. Introduction

The implementation of mobile kitchens within design education environments represents an innovative convergence of social practice, community building, and material exploration in contemporary design education. This paper explores the role of mobile kitchens as dynamic pedagogical tools that foster collaborative learning environments and hands-on experiences in material exploration and sustainability. The transformative impact of shared mobile kitchens is examined across three qualitative case studies, each situated in a different institution.

Over the past six years, three separate mobile kitchens have been designed or adapted, built, and implemented in different post-secondary art and design education settings across North America, in addition to one non-profit organization. The small territorial unit of a university campus within a city provides a unique opportunity to examine a diverse range of activities and interactions (Fassi et al, 2024) as they relate to larger food and social systems.

The first mobile kitchen in this series was developed in 2018 as part of a senior capstone project for an undergraduate industrial design degree in Vancouver, Canada by Joey Shin Yee Cheung. The design was prototyped and revised through a series of 11 co-design experiments that invited community members including students, faculty, and staff to stage food gatherings in different spaces on campus. The resulting kitchen design provided a hardwood cooking surface on four locking casters with two collapsible leaves on either side, a double burner induction cooktop, air fryer convection oven, and basic cookware. Components of the mobile kitchen are easily modified based on the needs of a particular workshop, class, or event. Designed to accommodate the dimensions of interior architecture such as doorway widths, the kitchens can be placed anywhere with access to a power outlet.

The second and third mobile kitchens were built in 2020 and 2024, respectively. They are successors to the first, with adaptations to their specific universities in Brooklyn, New York, and Toronto, Canada. To date, these kitchens have been used by community members for weekly meals (made from campus area community-supported agriculture), bioplastic experiments, candy casting workshops, natural dye processing, off-site public events, and a dumpling workshop that facilitated a discussion about multilingual experiences in design studio critique. A mobile kitchen, even when rudimentary, empowers students to use food as a material to address complex issues.

In the context of making tangible prototypes, mobile kitchens can be an addition to the existing infrastructure of a school (e.g. woodshop and metal shop) and act as their own labs, but are also a site of convivial assembly, supporting the studio culture in all other making spaces. Mobile kitchens become a site of gathering and promote a spirit of collaboration and an on-going network of community care. (McCarthy, 2022) Mobile kitchens in design education are not merely ancillary tools; they embody a shift towards experiential, community-oriented learning in contemporary design education. Through using food, the connection to the social issues of climate crisis, migration, food insecurity, and health and well-being enable students to become informed citizens engaged with the cultural and ethical dimensions of their design work.

2. Context

Cheung designed the first iteration of Mobile Kitchen 1 (MK1) at Emily Carr University of Art + Design employing methods of social practice and community engagement as a response to the issue of food scarcity at a new campus location. Cheung was born in Vancouver, raised in Manila and Hong Kong, and is a 2nd generation settler of Chinese descent with a migration journey. Cheung drew inspiration from their culture and lived experience where food had the ability to bring communities together and sustain relationships. In megacities with pervasive food insecurity, street vendors and food stalls offered affordable, accessible and culturally relevant food options regardless of socioeconomic status. Manila street cart food options include “inihaw” (charcoal-grilled) and “tusok-tusok” (literally, pierce-pierce) and Hong Kong dai pai dong 大牌檔 (cooked food stalls) food options include dip tau fan 碟頭飯 (rice plates), siu mei 燒味 (roasted meats), toasts, sandwiches, varieties of pastries and many more. These food carts and stalls create a lively gathering space, reflecting the rich and diverse culinary heritage of both megacities, and serve as a source of inspiration for the mobile kitchen project.

MK1 was designed as a platform for cultivating community through collaborative cooking and shared eating. The kitchen was designed to offer a space and tools to create meals while also meeting the need for connection and community. MK1 explores how the act of cooking and eating as a collective can strengthen relationships with community members and enable conversations around food insecurity, culture and identity, migration, and health and well-being, issues that campus community members experience day-to-day. MK1 is a site for nourishment and exploration, disrupting the dominant culture within the art and design institution by creating an environment where students and staff can convene outside of the classroom and create connections in an unstructured setting.

MK1 was designed in conjunction with the Social Practice Kitchen, a collective of students focused on social well-being through food. Co-developed with other artists to deliver a series of community engagements at Emily Carr University of Art + Design, Cheung explored the intersections of art and design by pairing industrial design and Social Practice and Community Engagement (SPACE) in their project. Through their involvement in the students’ union as a representative of the design department and as the Board of Governors student representative, Cheung used prior knowledge of plans for the campus to relocate as the focus of their capstone project because of the various student-facing issues associated with the move. The site of the new campus in a newly developed neighborhood with limited access to affordable, accessible and culturally relevant food options was a significant concern. The institution contracted one vendor to provide food for the entire institution with limited and costly menu options. This site-specific issue was chosen as an opportunity to address the potential risk of food insecurity while also testing a new approach to connecting people and building community.

3. Methodology

3.1 Prototype through Co-Design

The Social Practice Kitchen (SPK) was a series of community engagements that complemented MK1 and was a collaboration between art and design disciplines. These engagements employed a co-design process and served as a starting point for research into the form and subsequent functions of MK1. In the co-design process, volunteer cooks ranging from students to staff were engaged through SPK to understand their needs around tools, storage, and space.

A simple prototype was created using a cart constructed from plywood with supplies such as a portable cooktop, pots, pans, and other cooking tools that were placed in various configurations to test for functionality. Additional components such as hooks or shelving were added based on feedback over the series of 11 SPK engagements, and research into the aesthetic considerations began once sufficient feedback was gathered.

Observations were documented through written notes and photographs collected as part of the project process. Participants also shared stories of their personal experiences which were documented through written notes. A combination of quantitative and qualitative data analysis methods was used. Quantitative data analysis made use of the number of meals and participants to inform frequency and allocation of resources for subsequent interactions while quantitative data analysis made use of the feedback around food preparation and cooking, along with personal stories, to inform the functional and aesthetic elements of the kitchen.

3.2 Engagement and Recruitment Methods

MK1 featured three actionable engagement methods: daily usage, events, and workshops. Daily usage included use of MK1 within the industrial design studio space where students would cook for themselves and others on an as-needed basis. Events included SPK engagements within the Critical + Cultural Practice (CRCP) studio space where community members across the institution could access the mobile kitchen on a weekly schedule over the lunch period. Workshops included demonstrations of MK1 at the 2018 graduation show, and as a three-day pop up at the 2018 International Conference for the Arts in Society. All three engagements included ethnography as the research methods done through observations and interviews prior to, during and after each interaction with the kitchen, along with photography, to gather data from participants through shared meals and social interaction between participants.

MK1 was situated in the industrial design studio where peers were invited to use the prototype for daily use, and provide suggestions for subsequent iterations. SPK events took place in the CRCP studio space and were promoted throughout the campus via posters and word of mouth. Interested volunteers contacted the SPK team at events or over email and signed up to prepare a meal for a specific week. Volunteers would plan meals, request a reimbursement for associated costs if needed, and were responsible for procurement and transportation of ingredients. The SPK team provided additional support where needed, but volunteers were responsible for all preparations leading up to the scheduled SPK event date. Workshops such as the demonstrations and pop-ups underwent an application and approval process with organizers to promote the initiative and share the experience with visitors. This required a menu to be prepared in advance and approved by the workshop organizers and campus administration to ensure

compliance with health and safety protocols.

3.3 Aesthetic Considerations and Final Design

With feedback from the SPK events, further research was made into the aesthetic considerations of MK1. The physical constraints of the new campus along with the diverse backgrounds and lived experiences of volunteers lead to the choice of a simpler aesthetic that could compliment the space and community members. As a result, precedent research of art and design movements was done to explore which aesthetic would best represent the mobile kitchen and its intended purpose. The De Stijl movement was chosen for its abstract, pared-down aesthetic centered in basic visual elements such as geometric forms and primary colors to serve as the foundation of MK1. The simplified design ensured that MK1 could be adaptable to any environment and the use of primary colors, much like the foundations of the color spectrum, represent fundamental elements of the community building experience. MK1 was built using local western maple with a natural finish to create a warm and welcoming atmosphere in contrast to the concrete interior of the new campus - with the intent for the kitchen to develop a patina over time with continued use.

The final considerations for the design of MK1 were informed by the physical space constraints of the three engagement sites: the industrial design studio space, CRCP studio space, and cafeteria area. Dimensions were calculated to fit through hallways and in various rooms during transport, incorporating folding bracket shelves on the working surfaces to minimize the kitchen's footprint when not in use. MK1 allows engagement from every direction to maximize working surfaces, as each side of the kitchen can be accessed for different activities such as ingredient preparation, cooking, and serving.

Figure 1a and 1b. Front and back views of Mobile Kitchen 1. Image credit: Joey Shin Yee Cheung

4. Mobile Kitchens as Design Lab

4.1 Social Practice Kitchen

Based on the learnings through the co-design methods above, MK1 was then implemented as a complete mobile design to support gatherings. The SPK community engagements consisted of 11 events where volunteers signed up to cook a vegetarian or vegan meal for the collective community. Meals were typically culturally relevant to the volunteers and were initially funded by micro grants from the institution with options for

community members to donate additional funds. Volunteers included students, administration staff, librarians, and one security guard. The events also served as an opportunity for students to connect with other groups on campus to have conversations and build relationships outside of their usual interactions.

Table 1. Social Practice Kitchen (SPK) Events

SPK Event	Title / Major	Contribution
Event 1	Fine Arts Major	Maghmour
Event 2	Fine Arts Major	Black bean soup, bread, avocado and sour cream
Event 3	Film Major, SPACE Minor	Ddukbokki and green onion pancakes
Event 4	Ceramics Major - Visual Arts Major, Curatorial Practice Minor	Tofu pudding - eggplant stew
Event 5	Student Development Advisor - Admins Assistant - Director of Counselling - Live Musician	Lentil soup, butternut squash salad, naan - sweet treats (i.e. cookies and cupcakes) - pizza - live music
Event 6	CRCP Major - Industrial Design Major and SPACE Minor - Film Major and SPACE Minor	Spinach potato balls
Event 7	Industrial Design Major	Zahra bi tahineh
Event 8	Fine Arts Major - Animation Major	Sinigang and rice
Event 9	Continuing Studies Major - Security Staff	Ratatouille - Paratha and rice kheer
Event 10	Visual Arts Major - Visual Arts Major	Spinach rolls - Arepas and guacamole
Event 11	Librarian	Chickpea pasta - potato salad - channa daal with potatoes - cinnamon apples

At the start of each SPK event, volunteers would share details about their relationship to the meal and conversation topics would emerge organically. The variety of meals showed the diversity of lived experiences at Emily Carr University of Art + Design and contributed to the range of topics that were discussed including migration stories, cultural beliefs and traditions, and important food memories that shaped identity. Other more nuanced conversations were also held around social norms and political crises that affect the daily lives of the community, both locally and in their home countries, particularly around the effects of climate crisis and sustainable food practices. Volunteers would share stories about their experience sourcing ingredients and the need to adapt through substituting with similar flavors when ingredients were not available or accessible due to the costs associated with importing or the limited availability of the ingredient outside of their home countries. Conversations were not programmed and were consent-based, which allowed for ease in participating and trust-building over time. Though meals were culturally relevant, recipes were also modified to be accessible and took into consideration various dietary restrictions while also keeping costs low. The resulting meals had elements of familiar and comforting flavors while staying relatively

nutritious and healthy.

An exemplary event using MK1 was a dumpling workshop during Multilingual Week in spring 2019, a series of events to explore how multilingual students can be supported on campus. In an informal survey conducted by a university lecturer, 63% of the student respondents were fluent in two or more languages. Billed as a "dumpling workshop for social change", the event was run by a faculty member and gathered dozens of students across disciplines to work with their hands rolling out dumpling dough and folding dumplings as a tactic for discussing challenges in multilingual studio classroom environments.

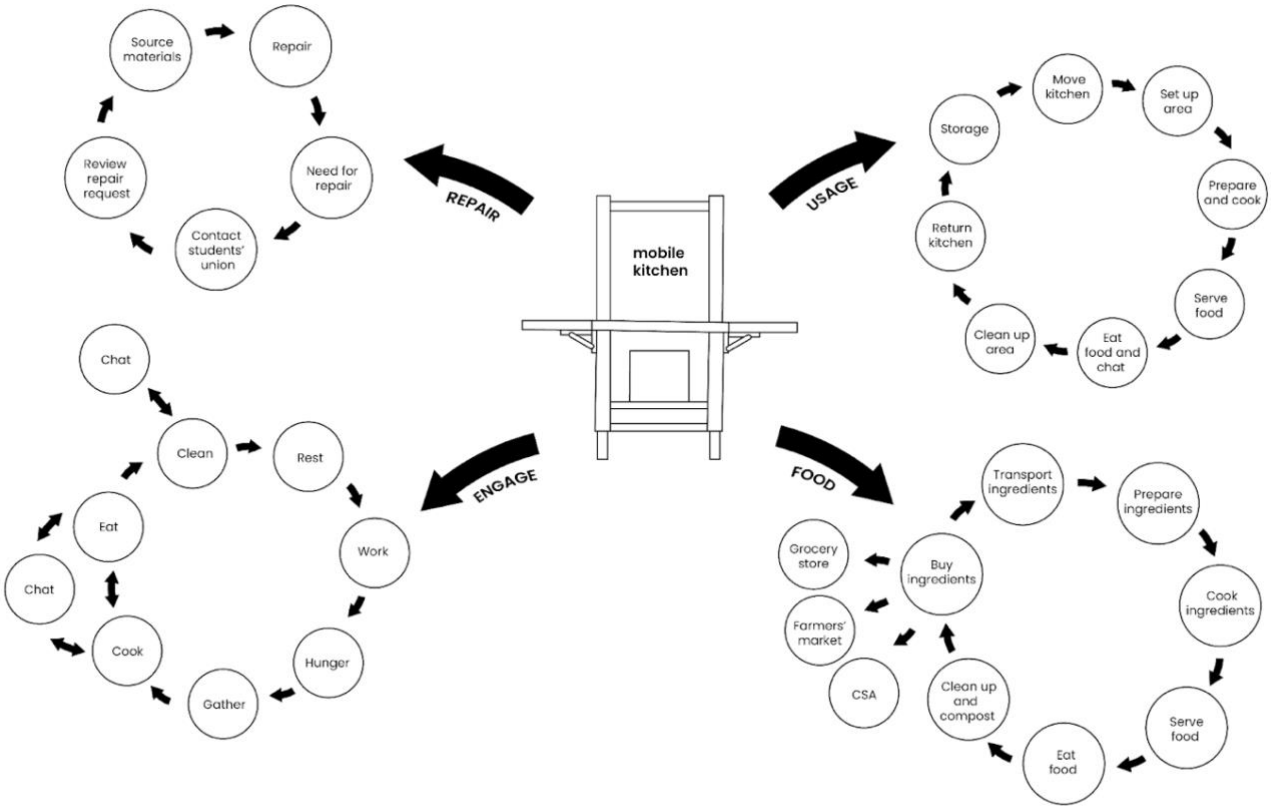

Figure 2. Systems map of typical interactions associated with the mobile kitchen.

4.2 Mobile Kitchen 2

The second version of the mobile kitchen was developed at Pratt Institute in 2019 by Huynh, then a new faculty member at the institution. Huynh planned to develop a new food design and materials curricula, and saw a need existed to develop a platform for those endeavors. Using MK1 as a basis, Huynh took the essential elements of the cart as specified by Cheung for MK1: the induction cooktop, oven air fryer combination, drop leaf hinges, and heavy-duty casters. The design and materials were funded through a small start-up research grant, part of which paid Cheung, the designer of MK1, for their design development work. The mobile kitchen needed to be adapted to the constraints of an older building (built in 1889), its doorway and elevator clearance and the needs of the Pratt teaching, learning, and research community.

Mobile Kitchen 2 (MK2) was constructed in Summer 2020, when most students, faculty,

and staff were off campus due to the pandemic. The design features wood construction and large drop-leaf countertops like MK1 and reimagined the rear panel to be a pegboard for tools and a space for signage. The kitchen was outfitted with a double induction burner, a small oven, basic cookware, and donated utensils and pantry staples. (Figure 3) Unlike MK1, which is sited in a single large building, MK2 exists on a campus with multiple buildings and the design addressed the need to travel across cobblestones and pavement.

Figure 3. Renderings for Mobile Kitchen 2, showing the drop leaf counter space. Image credit: Amanda Huynh and Kai Chuang

The mobile kitchen debuted as a gathering point for weekly "BYOM(ug)" events on campus in collaboration with the School of Design Dean's Office. The mobile kitchen was positioned at the front lobby of the school for several mornings, serving tea and homemade pastries to students returning to campus after the pandemic lockdown. It was the first time that many community members had seen one another since pre-pandemic lockdown, and gathering in person felt novel. Community members were curious about the kitchen and asked about ways to engage with it. MK2 was exhibited at the annual Pratt Institute Research Open House, further promoting it as a site for in-class demonstrations, material experimentation, and communal gathering.

Shortly after MK2 was operationalized, another organization on campus, known as Farm to Campus, started an initiative to bring weekly community-supported agriculture (CSA) produce to be purchased by community members at a low cost. Campus partnerships such as the CSA connected the students through MK2 with produce grown by regional farmers and sourced through GrowNYC, a sustainability resource for all New Yorkers interested in food access, conservation, green spaces, and education. (*GrowNYC | The Sustainability Resource for New Yorkers*, n.d.) The nature of CSA produce is that it is not always predictable, but always local and seasonal. Farm to Campus subscribers are not able to choose what is ordered nor know what is available the following week. Excess food

that was not picked up and would have otherwise gone to waste could be prepared by students. Students have to problem solve around unfamiliar ingredients and experience first-hand the challenges that climate crisis poses on our access to food. Engaging with food through MK2 creates an access point for more complex issues to enter art and design conversations.

A recent example of a public engagement with MK2 was in collaboration with pigment artists and the campus natural dye garden. The Harvest Salon was an event to celebrate the end of the growing season in the dye garden. The event featured a participatory art installation by Narkita Wiley made with indigo dye and inspired by a West African folk tale. MK2 was on site to serve food and drink made with ingredients from the Farm to Campus CSA as well as natural pigments from the garden, with offerings including candied cosmos flowers and beet and marigold pickled eggs. Participants included faculty, staff, students, and people from the surrounding communities, spanning art and design disciplines from industrial design to fashion, artists, and writers.

Beyond event-based engagements, the mobile kitchen is used to support art and design curricula. It is used as the main laboratory space for assignments such as a 3D printed pasta design project, where students work through pasta experiments. As students became more interested in working with biologically derived materials such as bioplastics (plant-sourced, compostable polymers), MK2 became central to their studio projects as a place to combine ingredients for their starch, gelatin, or agar-based recipes. Where MK1 was successful in building community on campus, MK2 is used more as an extension of studio lab space for assignments: biomaterials experimentation required the cook top and work space, a capstone studio focused on nourishment and social change frequently used the cooktop and serving ware for prototyping breakfast foods, and casting principles were taught through demonstrations making sugar molds (similar to sand casting). As food is a material with a low barrier to entry — people encounter it often, it's relatively low cost and available — we can use it to teach iteration and improvisation in making. Through integration with curriculum, MK2 supports using food as both a material and a tool for communication, allowing for student exploration on the topics of food waste, cultural sustainability, community building, social innovation, food security, and service design.

A graduate assistant is employed with additional funding for project documentation throughout the academic year and to assist with outreach, bookings, and maintenance. The kitchen became available for bookings in the same system as other labs and studios such as reprographics lab and fabrication spaces to support curriculum, events, and research. Although not formally tracked, MK2 has been used extensively by disciplines in both art and design and is a familiar site across Pratt Institute's campus.

4.3 Open Source Mobile Kitchens

MK2 was borrowed by Street Lab, a non-profit organization in New York City that works on urban placemaking for one of their events featuring a local business in summer 2022. MK2 was taken off campus and transported in a van to site. Shown in Figure 4, the mobile

kitchen was used by a Thai restaurant for a Thai iced tea demonstration. The kitchen's pegboard was used by the Street Lab team for a community engagement activity to invite passersby for their feedback and to design their own future vision of the street. Street Lab subsequently developed their own version of a mobile kitchen for regular use in 2023 (Figure 5). This kitchen is used to feature local businesses on open streets, offering an outdoor space for food-centered demonstrations and public education, maintaining the spirit of the original mobile kitchen.

Figure 4. Mobile Kitchen 2 in use by Street Lab, a local New York City non-profit, 2022. Image credit: Street Lab

Figure 5. Street Lab's own mobile cart in use, 2023. Image credit: Street Lab

A third mobile kitchen, Mobile Kitchen 3 (MK3), has been built at OCAD University in Eastern Canada as of 2024. Like MK2, it was funded through a small grant application by a faculty member. MK3 serves as a social wellness mobile kitchen that is housed in a design incubator about a 15-minute walk from the campus. The mobile kitchen travels between these two locations supporting curriculum and events. It was developed to explore the

concept of a third space: "the '*third space*' is generally defined as the area between official curriculum and informal knowledge, with skills and dispositions brought in from outside culture." (Potter & McDougall, 2017) In its nascent stages, the aim of MK3 is to highlight cooking as an act of care, supporting students towards more engaged design practices.

Figure 6. Mobile Kitchen 3 presented at OCAD University by Professor Ranee Lee. Image credit: Katya Koroscil

The design plans for Mobile Kitchens 1 and 2 have been made available for students and faculty at peer art and design institutions and non-profit organizations. We openly share a spreadsheet of recommended hardware and equipment such as the induction cooktop and convection oven, with suggestions for improvements.

5. Challenges

5.1 Safety and Concerns

Challenges for mobile kitchens in art and design institutions have included the issue of food safety and safe food handling for amateur cooks preparing food for a community. In the context of galleries and exhibitions, additional food safety requirements may apply. For in-class food-sharing, the scenario is like a typical potluck where different types of food are brought in for sharing. Food safety and cleanliness issues can be mitigated through completing food safety training and supervising cooking activities to ensure compliance with food safety measures. We found that the mobile kitchens ideally require access to running water for preparation and clean-up.

Concerns around fire safety when cooking indoors were taken into consideration and led to the choice of installing an induction burner and portable convection oven as the main appliances to reduce the risk of accidental fires. There were also concerns that sharing wall outlets with other students and staff could lead to a circuit overload, which were alleviated with the addition of extension cords to ensure available power outlets with sufficient wattage capacity were being used across the campuses.

An unanticipated challenge was the perception of competing with existing food service contracts and cafeteria-style food service. We made the case that students should be empowered to feed themselves and framed the mobile kitchens as a site for learning and engaging with community members as opposed to being in direct competition with the

cafeteria-style food service on campus. Concerns were also identified around allergies and recipe modification, and around costs associated with running the kitchen. With MK1, it was found that vegan meals were the most accessible type of food and kept food costs relatively lower for more servings overall. As communities regularly engaged with the mobile kitchens, modifying recipes became a recurring focus for inclusive participation.

5.2 Maintenance and Repair

The biggest challenge to mobile kitchens in an academic setting lies in the need for sustained upkeep, as with any other laboratory. In the systems map (Figure 2), these are highlighted with the “Repair” and “Usage” interactions. Maintenance and repair were accounted for by specifying replaceable components such as portable appliances, along with hardware that would see the most use such as the casters and folding brackets. In our experience, successful stewardship requires a faculty or staff member to see the mobile kitchen through cycles of students, as well as student volunteers or assistantships to support day-to-day operations. While relatively small, these activities require funding over long periods of time.

6. Conclusion

We have had the opportunity to build up 3+ mobile kitchen sites over 6 years and believe our contribution to be significant. From campus to campus, adjustments are made for physical constraints (elevator doors, entryways, types of flooring and terrain) and adapted to the needs of each community. MK1 was focused on food insecurity and opportunities for various community members to convene and connect outside of the classroom whereas MK2 was focused on curricular tie-ins to projects and courses. These mobile kitchens served as pilot models, inspiring the third iteration (and beyond) to create unique adaptations to serve their respective communities. The overarching structure remains—a portable cooktop, minimal utensils and cookware, a small oven, a work surface area, and four wheels.

In the context of tangible prototype-making, mobile kitchens can serve as unique, living labs, integrating into the existing infrastructure of design schools alongside traditional spaces like wood and metal shops. More than just functional tools, mobile kitchens foster a sense of community and conviviality, supporting the collaborative studio culture that extends throughout all making spaces. They provide a space for social interaction and foster a continuous network of care, promoting cross-disciplinary dialogue and engagement. These kitchens represent a notable shift toward experiential, community-focused learning in modern design education. They enable students to connect their work to critical social issues—such as climate change, migration, food insecurity, and health—empowering them to become informed, socially-conscious citizens and designers. By intertwining hands-on design practice with pressing global concerns, mobile kitchens invite students to engage with the cultural and ethical implications of their design choices, transforming the educational experience into one that is as much about making meaningful connections as it is about creating tangible objects.

We look forward to seeing new uses for emerging mobile kitchens as we come to further address the importance of food as a material and the significance of convivial gathering in urgent times.

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Promoting Sustainable Dining through Spatial Design Transparency: The Impact of Design Elements and Environmental Awareness

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ABSTRACT | This research proposes to study the impact of spatial design transparency elements such as open kitchens, visible food sourcing, and eco-friendly design on sustainable dining preferences within restaurants. Previous studies have found menu transparency and corporate social responsibility to boost consumer trust and loyalty (Kim & Ham, 2016; Shafieizadeh & Tao, 2020). Research shows that green practices and indigenous sourcing elevate image and consumer loyalty (Chaturvedi et al., 2024; Suttikun & Mahasuweerachai, 2023) and sustainable practices can help build an eco-conscious image (Karagiannis & Andrinos, 2021). However, few studies explore spatial design in restaurants, fostering sustainable dining choices. The sample for this study includes 300 frequent diners at casual and fine dining restaurants in India, regardless of preference for sustainable choices. Using multiple regression, this research explores the direct effects of spatial design transparency on sustainable dining preferences, with consumer environmental awareness as a moderator, as consumers are reactive to transparency and sustainability cues in dining environments (Pozelli Sabio & Spers, 2022; Yang et al., 2022). Findings are expected to provide practitioners with experiential design strategies that encourage sustainability, offer researchers new insights on transparency in spatial design, and help educators in amalgamating environmental awareness into design education.

KEYWORDS | Spatial Design, Sustainable Design, Food Design, Dining Experience, Sustainable Dining Preferences

1. Introduction

Global consumption patterns have undergone significant changes over the years.

Improvement in economic conditions, advent of social media, foreign travel, urbanization are amongst the many drivers influencing the choices of modern-day consumers. Dining establishments, an integral part of the hospitality sector, are at the center stage of this revolution. Today there are multiple dining options available to explore, and due to high disposable incomes, people are dining out like never before. Research shows that green practices and indigenous sourcing alleviate image, enhance consumer loyalty resulting in willingness to pay premium prices (Suttikun & Mahasuweerachai, 2023), influences perceptions and experiences (Karagiannis & Andrinos, 2021), and enhance revisit intention (Chaturvedi et al., 2024).

Today, the global food and beverage sector is envisaged to grow by 5.99% between 2022 and 2028, valued at approximately $7,464.3 billion (Rajan et al., 2024). The Indian food and beverage sector is expected to grow by 14.94%, projected to reach USD 30.75 million by 2027 (Statista, 2024). Despite the trajectory, in this age of information, consumers are also becoming astoundingly aware of the environmental issues and the ill-effects arising due to this surge. The total greenhouse gas emission from the hospitality business today stands at 34%, wherein the food and beverage sector stand as a major stakeholder. The sector is also grappling with a bunch of other issues including deforestation and land use mostly caused by unsustainable sourcing, inefficient energy consumption, food waste, transportation, and packaging (Crippa et al., 2021). It is only fair to state that the need of the hour is to devise some strategic solutions that hold potential to moderate environmental harm while favorably impacting consumer behavior.

Previous studies have highlighted significance of physical spaces as compared to the tangible products contributing to positive buying behavior, termed as the theory of atmospherics (Kotler,1973). The same theory has also been used to enhance image in service businesses like hotels, restaurants, banks etc., famously known as Servicescape (Bitner, 1992). The key aspects of physical space, specifically the environment, spatial layout, and design elements are purposefully constructed to attract consumers and enhance patronage intentions (Wakefield & Blodgett, 1994). Additionally, multidisciplinary research has been conducted in environmental psychology and marketing demonstrating the importance of spatial layouts in creating aesthetically appealing spaces for both consumers and service providers (Ali & Amin, 2014; Kandampully et al., 2023; Rianmora et al., 2023), also in promoting customer loyalty at theme hotels (Chang & Lin, 2024). For hospitality establishments (Apaolaza et al., 2020), beyond design, researchers also laid emphasis on the role of décor elements like - signs, symbols, and artifacts (Marandi et al., 2024), furniture (Lee et al., 2023), and ambience (Chen et al., 2023). These attributes impact the psychological and behavioral intentions of eco-conscious consumers (Li, 2021).

Taking cues from the existing research, spatial design transparency emerges as a significant aspect of the physical environment, especially for service businesses where transparency is key for building consumer trust and loyalty. For instance, Kim and Ham (2016) reported that green initiatives, like sustainable operations and environment certifications, positively influence brand reputation, supporting the relationship between dining businesses and consumers. Further, Shafieizadeh and Tao (2020), discovered that by promoting sustainability policies and community involvement as part of corporate social responsibility (CSR) initiatives will in turn boost consumer trust and loyalty. In another study by Yang et al. 2022, it was discovered that information on recipes and food supply chain enhances customer trust. Furthermore, Pozelli Sabio and Spers (2022) highlighted that transparency in sustainable food chains, such as clear labelling of the ingredients and information about the origin, can enhance sustainable food consumption thereby reducing the harmful environmental impact of alternate food networks.

Despite these insights, much of the existing research focuses either on informational transparency like menu labelling and certifications, or on spatial layout and design elements for hospitality establishments, primarily hotels. In contrast, research on dining establishments exploring the potential of spatial design transparency elements like open kitchens, visible sourcing displays, eco-friendly designs and their impact on sustainable dining preferences remains rather scarce. The present study addresses this gap by examining how spatial design transparency elements influence sustainable dining preferences, with consumer environmental awareness as a moderator.

Consumer environmental awareness has emerged as a significant factor influencing sustainable behavior. As per the global sustainability study (Gathen et al., 2024), 64% of consumers, across USA, Germany, UK, Australia, the Netherlands and India, rank sustainability amongst the top three value drivers across product categories when making purchase decisions. To understand these dynamics, this research leverages the Theory of Planned Behavior (TPB) to understand the nuances of consumer attitudes, societal norms, and perceived behavioral control affecting responses to spatial design transparency in dining establishments. Ajzen (1991), in his research on TPB, established that intention is a strong predictor of behavior, further influenced by attitudes, subjective norms, and perceived behavioral control. Past studies, for instance Chung (2016) found that three constructs of TPB positively impact intentions to re-visit green restaurants and share positive recommendations reiterating the importance of sustainability for dining establishments. Moon (2021) introduced two predictors, past behavior and dining frequency to TPB and explored consumer beliefs impacting green restaurant patronage in Korean context. The findings show that perceived behavioral control emerged as a significant determinant followed by behavior, and societal norms. In a similar study, Shishan et al. (2021) found past behavior and TPB positively influence intention to dine at green restaurants in a UK sample. The results indicate that, apart from gender, the impact of sociodemographic intentions to dine at green restaurants was not significant. In another study amongst British diners, Nimri et al. (2024) gave a new model based on TPB integrating altruism. Control beliefs and altruism emerged as key factors influencing intentions to dine at green restaurants. In fact, in a recent systematic literature review focusing on the last decade, in about 118 publications TPB has been extensively used to explore consumer green behavior and purchase intentions of food products (Rozenkowska, 2023).

Nonetheless, given the environmental challenges in the hospitality sector the significance of this research both for practitioners and academicians cannot be overstated. With inefficiencies in sourcing, energy use, and waste management, the intersection of spatial design transparency and consumer environmental awareness presents an opportunity to address these pressing issues. Visible sourcing displays and open layouts not only enhance consumer choices but also motivate establishments to align their operations with wider sustainability goals such as reducing food waste and promoting local sourcing. Like, Jeong and Jang (2010) explored whether green practices in restaurant's have an impact on brand image and purchase intentions. The results indicate that green practices influence perceived ecological image mostly focusing on the use of recyclable take-out containers, recycling waste, and energy efficient lighting by the restaurants. In a similar study, conducted on a Vietnamese sample Khuong et al. (2023) found that green practices like recycling, composting, energy and water management programs positively enhance consumer emotional attachment and purchase intentions in a dining establishment. In another research Chaturvedi et al. (2024) explored the impact of green restaurant's sustainable practices on consumer satisfaction and intention to revisit. The findings revealed that sustainable practices like food safety, food sustainability practices, food quality, and environment sensitivity have a positive impact whereas willingness to

pay had a sensitive moderating effect. Other studies explored non-physical attributes like psychological factors including concern about the welfare for others (Tan et al., 2018); and communication strategies (Xu & Jeong, 2019) impacting consumer decision to dine at green restaurants. It is evident from the literature surveyed so far that limited research has explored how design features like open kitchen, visible sourcing layouts resonate with environmentally aware consumers, particularly in emerging markets like India.
This work adds to the growing body of literature by making three significant advancements. First, it shifts the application of transparency from an informational to a design-led context, emphasizing the role of spatial features in influencing consumer behavior and advancing academic understanding. Second, it incorporates consumer environmental awareness as a moderating factor, offering new insights into how individual perceptions shape responses to sustainability cues. Third, it provides actionable recommendations for hospitality managers and policymakers to align operations with global sustainability goals and emerging consumer preferences.

1.1 Hypotheses

The following specific hypotheses were proposed:
1. Spatial design transparency elements will influence sustainable dining preferences.
2. Consumer environmental awareness will moderate the relationship between spatial design transparency elements and sustainable dining preferences.

2. The Study

This research aimed to examine the relationship between spatial design transparency elements and sustainable dining preferences, moderated by consumer environmental awareness. For assessment purposes spatial design transparency elements are further divided into two variables, first is spatial design which includes elements like open kitchens, and ecofriendly design and second variable is visible sourcing which incorporates application of organic food, green products, and green materials. The direct and indirect effects were assessed using multiple regression analysis.

2.1 Sample

The sample comprised of individuals who had the means to dine at restaurants. Data was collected from 306 participants who ranged from 20 years to 65 years of age (M = 33.827, SD = .12.253). Among these, 49% were females and 51% were males.

2.2 Test and Tools

Separate scales using responses on a Likert scale (1-strongly disagree to 5 – strongly agree) were developed to study the four variables under study.

To assess sustainable dining preferences, four items were adapted from prior studies of customer intention to purchase green products (DiPietro et al., 2013; Jang et al., 2015; Khuong et al., 2023; Shapoval et al., 2018). Higher scores indicate strong purchase intentions towards sustainable dining in restaurants.

To assess spatial design, a total of 12 items were adapted, four-items for application of recycling and composting management activities: (Jang et al., 2015; Khuong et al., 2023); four-items for application of energy and water management: (Khuong et al., 2023; Wang, 2012); three-items for application of eco-friendly supplies: (Khuong et al., 2023; Schubert at al., 2010), and one extra item was added on the basis of our conceptualization to the item pool. Higher scores indicated greater appreciation for these sustainable elements in spatial design at restaurants.

To assess visible sourcing four items were modified for application of organic food-green products and materials (Khuong et al., 2023; Yusof et al., 2017). Higher responses indicate greater preference for dining at restaurants following sustainable sourcing practices.

Lastly, to assess consumer environmental awareness, eight items were adapted from research on customers' pro-environmental emotional attachment (Jang et al., 2015; Khuong et al., 2023; Yuksel et al., 2010). Higher scores indicated a stronger emotional identification with eco-friendly restaurants.

Further, to ensure content validity all measures were circulated for review by two restaurant managers, and two academicians in the food and beverage sector. Then, after making the necessary changes a pre-test was conducted with ten consumers who dine frequently.
Cronbach's alpha for all the scales used in this study lies between .852 to.963, which exceeds the appropriate level of internal consistency reliability (Hair et al., 2019).

2.3 Method

All analyses were carried out using SPSS 30. Multiple regression was carried out, with all predictors entered together to assess the direct effect of the two elements of spatial design transparency elements spatial design and visible sourcing, and consumer environmental awareness, on sustainable dining preferences. Interaction terms were included in the model to test the moderating role of consumer environmental awareness in the effect of spatial design and visible sourcing.

3. Results and Discussion

The regression model was statistically significant, wherein spatial design transparency elements, visible sourcing, and consumer environmental awareness explained 58.8% of the variance (R^2 = .588, F (3,304) = 144.917, p<.001). The results are shown in Table 1.

Table 1. Regression Results.

Predictor	B	Std. Error	Beta (β)	p-value	Tolerance
Spatial Design	.476	.058	.455	<.001	1.929
Visible Sourcing	.201	.058	.103	<.001	1.929
Consumer Env. Awareness	.284	.045	.307	<.001	1.929
Spatial Design x Consumer Env. Awareness	-.033	.061	-.032	.590	-
Visible Sourcing x Consumer Env. Awareness	-.028	.068	-.028	.680	-

Out of the three predictors, spatial design had the highest impact on sustainable dining preferences (β = .476, p<.001), highlighting the importance of elements like open kitchen, and ecofriendly design. Thus, these results support the first hypotheses of the study wherein spatial design transparency elements influence sustainable dining preferences to a larger extent as compared to consumer environmental awareness, and visible sourcing. These findings are consistent with past studies focusing on the power of spatial layouts, concepts like servicescape, and theory of atmospherics (Kandampully et al., 2023; Kotler,1973; Rianmora et al., 2023) in shaping consumer behavior. In fact, previous research

on hospitality design and consumer experience has shown significance of décor elements like - signs, symbols, furniture and ambience (Apaolaza et al., 2020; 2023; Chen et al., 2023; Lee et al., 2023) in influencing consumer behavior and enhancing trust.

Consumer environmental awareness emerged as the second significant predictor, with a smaller effect (β = .284, p<.001) as compared to spatial design. This finding is in consonance with past research as they focus on pro-environmental attitudes leading to behavioral changes (Ajzen, 1991; Moon, 2021; Shishan, 2021). However, the fact that it has a smaller beta than spatial design highlights the importance of design elements as a significant tool in dining establishments to boost customer trust as compared to consumer awareness. Also, contrary to the second hypothesis, consumer environmental awareness did not emerge as a significant moderator. Collectively, the results suggest that spatial design transparency elements operate at a basic emotional level, influencing behavior directly rather than awareness which operates on a more conscious level of decision making (Jeong & Jang, 2010). The present work shows that sustainability driven behaviors are most influenced by immediate spatial design elements in the restaurants rather than pre-existing environmental awareness or past perceptions.

Further, visible sourcing, was also identified as an influential factor impacting sustainable dining preferences (β = .201, p<.001), in consonance with earlier research showing its impact on consumer loyalty and consumption patterns (Yang et al., 2022).

These findings re-emphasize the importance of past research on significance of the physical environment affecting consumer behavior. Another possible reason for this could be the time and cognitive processing required to understand the sourcing information as compared to taking cognizance of design elements which happen organically.

To sum up, this study offers interesting findings as it emphasizes the significance of spatial design transparency elements as compared to perceived consumer environmental awareness in shaping sustainable dining choices. These outcomes are important for design practitioners and educators because they imply that after all, it is design-based strategies, and not just the environmental consciousness of the consumer, that can lead to sustainable behavior.

Specifically, from a design perspective, the findings of this study indicated that design elements, such as open kitchens and other eco-friendly design features, are more meaningful to practitioners compared to informational transparency in promoting sustainable dining behaviors. Integrating experiential design solutions into infrastructure strategies within initiatives and service contracts in the food and dining sector will create sustainable outputs. In addition, future research can focus on exploring specific design strategies like biophilic design, interactive displays of sustainability principles, and changing design arrangements to drive consumer engagement.

For academicians, this study challenges TPB based theories and implores changes in pedagogy to understand sustainable consumer dining behavior. The findings shift the focus from psychosocial factors to design transparency. It shows that spatial design elements are important which must be taught when studying sustainable dining preferences for restaurants. Future research can explore gender, group, cultural differences, and, long-term behavioral impact of spatial design transparency. Research on specific design elements which have the maximum impact is also warranted.

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RECONSTRUCTING A RESILIENT URBAN FOOD SYSTEM IN CHINA: INSIGHTS FROM GLOBAL EXPERIENCE

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ABSTRACT | With rapid urbanization, urban food systems face growing challenges from the spatial and temporal separation of food production and consumption. This study explores urban agriculture as a solution to mitigate these challenges by integrating food production into cities, reducing environmental impact, enhancing food security, and improving system resilience. Using a multiple case study methodology, six representative urban agriculture models from international contexts were analyzed. The findings informed the development of the "Concentric Ripple" model, a three-tier system comprising peri-urban farms, community hubs, and urban core flagship stores. This model strengthens food distribution networks, fosters consumer engagement, and optimizes resource recycling, while leveraging technology-driven production technics. The study concludes that urban agriculture effectively bridges the production-consumption divide, though persistent challenges in economic sustainability, stakeholder coordination, and sustained community participation requires further attention. This research offers a scalable framework for building sustainable and resilient urban food systems, adaptable to different urban contexts.

KEYWORDS | Food system resilience, urban agriculture, sustainable community, Metropolitan Area, food supply chain

1. Introduction

As urbanization advances and human society develops rapidly, economic and social divisions of labor have undergone profound changes, leading to significant transformations and challenges in human production systems. A critical issue has emerged in the agricultural sector: the spatial and temporal separation of food production and consumption within urban food systems (Dong et al., 2021). From a temporal perspective, the introduction of harvesting, processing, storage, distribution, and sales has significantly extended the food supply chain. From a spatial perspective, the rapid expansion of urban areas has consumed vast amounts of arable land, forcing agricultural production to relocate to rural and remote regions.

This spatial and temporal separation has led to a series of complex issues. Environmentally, extended transportation and prolonged storage have increased fossil fuel consumption and carbon emissions, while widespread intensive farming and genetically modified technologies have contributed to biodiversity loss, soil erosion, and ecosystem degradation (Lan et al., 2022). Socially, consumer rejection of "imperfect" produce and the rise of bulk purchasing have resulted in substantial food waste, exacerbating the global food waste crisis. Additionally, this separation has narrowed consumer choices, aggravated nutritional imbalances among urban residents, and diminished their awareness and trust in food sources. Economically, traditional smallholder farming models have been replaced by large-scale distribution systems, reducing farmers' bargaining power in the supply chain. Consequently, their profits are often squeezed by intermediaries, while consumers face higher costs (Proctor & Berdegué, 2020). Moreover, sudden events (e.g., the COVID-19 pandemic) have further exposed the fragility of urban food systems that depend heavily on external supply (Fan et al., 2021). Any disruption in the supply chain can lead to food shortages, severely impacting urban residents' quality of life and social stability.

Despite the global slowdown in urbanization, China remains in a phase of rapid urbanization. Due to its large population and regional disparities, the complexity of spatial and temporal separation in the food system has been further intensified (Zhang et al., 2017). On one hand, rural-to-urban migration and urban land expansion have increased food demand, while an aging population has exacerbated supply-demand imbalances. On the other hand, the loss of agricultural land and the urban-rural divide have placed additional pressure on food production. In this context, exploring ways to bridge the "production-consumption" gap in urban food systems and enhance their resilience and sustainability is a pressing priority.

Urban agriculture offers an innovative solution to mitigating spatial and temporal separation in urban food systems. Unlike traditional agriculture, urban agriculture integrates food production directly into urban environments, engaging city residents in agricultural activities and significantly reducing the spatiotemporal distance between production and consumption. Moreover, urban agriculture leverages modern technologies to achieve efficient, low-impact farming, optimizing urban land and water resources while improving food self-sufficiency and system resilience.

This study explores three key research questions:

- RQ1: How can systemic innovation reduce the spatiotemporal distance in urban food systems and redefine the relationship between production and consumption?
- RQ2: What roles do different urban agriculture models play in mitigating spatial and temporal separation, and how can these models be adapted to local contexts?
- RQ3: How can a resilient urban food system be developed in alignment with China’s socioeconomic and cultural characteristics to address both current and future challenges?

In recent years, the rapid development of urban agriculture worldwide has provided valuable insights into restructuring urban food systems. Urban agriculture can optimize limited urban space by utilizing rooftops, vacant lots, and urban peripheries for agricultural production. At the

same time, it connects producers and consumers through models such as community-supported agriculture, reducing intermediaries and enhancing the efficiency and transparency of food systems.

To answer the proposed research questions, this study examines urban agriculture case studies from both China and abroad, aiming to identify innovative models well-suited to Chinese cities. The goal is to offer both theoretical insights and practical pathways for developing a sustainable and resilient urban food system in China.

2. Methodology

Given the complexity of urban environments, global urban agriculture practices exhibit trends of diversity and actively innovation trends. This study employed a multiple case study methodology to explore strategies for constructing resilient urban food systems in China, facilitating understanding of dynamic interactions and contextual influences in complex settings. To address the limited integration of global insights into China's urban food systems, the method enables systematic analysis and comparison of diverse global urban agriculture models, identifying context-specific best practice while adapting them to China’s unique socioeconomic and cultural conditions.

To ensure comprehensiveness and representativeness, selected cases spanned various geographical regions, social backgrounds, and practice types (Dorr et al., 2023). The research process consisted of four key steps. First, the study defined research objectives and identified cases that can effectively reduce the spatiotemporal distance between production and consumption through systemic innovations. Second, selection criteria were established, including the extent to which cases address challenges such as production models, energy consumption crises, shifts in sales and purchasing patterns, food system resilience, and biocycle and waste management. Additional criteria included data availability, geographic and social diversity, and feasibility for implementation in China. Third, a comprehensive literature review and keyword-based case search were conducted to generate an initial cases pool. Subsequently, case relevance was assessed based on predefined inclusion criteria. Finally, the shortlisted cases underwent rigorous analysis and validation, resulting in the selection of six representative cases: three domestic cases, including Beijing Chaoyang Joy City Rooftop Farm, Shared Harvest Organic Farm, and Clover Community Garden, and three international cases, including South Philly High School Farm, Farm Urban, and Patchwork Urban Farms. These cases demonstrate innovative urban agriculture practices across different social contexts and provide valuable insights for advancing urban agriculture in China.

3. Cases analysis

Quzhou Luming Park, located in Zhejiang Province, China, was initiated by Professor Yu Kongjian. It continues his "New Peach Garden" urban vision (Yu, 2024), integrating agriculture, landscape, and ecology while leveraging the expertise of landscape architects. The project transforms urban green space into a productive landscape, incorporating rotational farming, native vegetation, and an ecological water system to create a self-sustaining urban oasis that balances food production, recreation, and environmental restoration. By embedding seasonal crop cultivation within the park’s design, it offers residents hands-on agricultural experiences and ecological education, fostering public awareness of food systems, sustainability, and biodiversity while enhancing social engagement. The integration of agriculture within the city core promotes multifunctional land use, strengthens urban food resilience, and reduces transportation-

related emissions, demonstrating the potential of landscape architecture in bridging the urban-rural divide. While well-suited for newly developed urban districts and ecologically sensitive areas, the project faces challenges in long-term policy support, operational management, economic viability, land use conflicts, and climate adaptability, which may influence its broader implementation and sustainability.

Located in Beijing, China, Shared Harvest Organic Farm is one of the earliest adopters of the Community-Supported Agriculture (CSA) model in the country. The project connects farmers and consumers through a membership system, where consumers prepay for farm products to support operations, and the farm delivers fresh organic produce to members regularly. In addition, the farm organizes hands-on farming experiences, allowing consumers to gain a deeper understanding of agricultural production and build trust in food sources. By eliminating intermediaries, the project shortens the production-consumption chain, improves food distribution efficiency, and reduces resource waste. Its membership-based model provides stable financial support for the farm while enabling consumers to actively participate in agricultural production. This shared-risk approach ensures income stability for producers and contributes to the long-term sustainability of the farm (Sun & Zhang, 2013). The project serves as a model for optimizing food distribution systems in peri-urban areas. However, its high level of participant commitment may limit large-scale adoption.

Initiated by Professor Liu Yuelai, the Clover Nature School is a government-led community co-construction initiative and a model for urban agriculture in China (Liu et al., 2019). As of 2024, the project has directly established or empowered residents to create over 1,200 mini community gardens across the country. The project consists of community gardens, nature education bases, community-building initiatives, and nature schools. By embedding agricultural production into communities and regularly organizing environmental education activities, it helps residents, especially children, learn about sustainable agriculture while integrating food production, ecological enhancement, and community interaction. Supported by an extensive "point-line-plane" community garden network, the Clover Nature School shortens the distance between food production and consumption, reduces dependence on external supply, and provides a platform for ecological education and engagement. It is particularly suitable for resource-constrained areas with high levels of community participation (Liu et al., 2016). However, the project's success relies on sustained enthusiasm and involvement from residents, as well as continued policy and financial support from the government. These factors pose challenges for its large-scale promotion and long-term sustainability.

Located in Philadelphia, USA, the Southern Philadelphia High School Farm is a community-initiated and managed farm project that integrates school and community resources. It primarily supplies fresh and healthy produce to school cafeterias while providing agricultural education and hands-on experiences for students and community members. Through its innovative integration of agriculture and education, the project enables engages students in growing, harvesting, cooking, and consuming food from their school gardens, reinforcing their understanding of food production (U.S. Department of Education, 2012). This significantly shortens the spatiotemporal distance between food production and consumption, strengthens community cohesion, and raises awareness of food security. The model is particularly suitable for resource-constrained areas with high community engagement, especially where strong ties exist between educational institutions and local communities. However, the farm's sustainability depends on long-term support, and its limited production scale constrains broader implementation.

Located in Asheville, North Carolina, USA, Patchwork Urban Farms was initiated by Asher

Wright in 2014. Through community land-sharing and a decentralized farming network, the project integrates multiple micro-farms into a flexible production system, maximizing the use of fragmented urban spaces and promoting local food production. By adopting a decentralized farming model, the project shortens the spatiotemporal distance between food production and consumption. Its produce is supplied directly to local consumers, restaurants, and farmers' markets, while financial sustainability is supported through the Community-Supported Agriculture (CSA) model. Although this approach demonstrates the advantages of multi-location production, the complexity of decentralized management and the high dependency on resident participation may limit its scalability.

Located in Liverpool, UK, Farm Urban was initiated by the company Farm Urban. By integrating hydroponic and aquaponic technologies, the project repurposes abandoned urban spaces for efficient agricultural production. The project establishes a closed-loop ecological system, enhancing production efficiency through water resource recycling while reducing transportation demands and resource waste. Its technology-driven model demonstrates the potential for advanced agricultural solutions in urban environments. However, the high cost and technical barriers of aquaponic systems limit its scalability and broader adoption.

Figure 1. The six aforementioned typical cases of urban agriculture.

Through an in-depth examination of these cases, this study employs narrative analysis and cross-case analysis to extract key patterns and design elements. Narrative analysis helps the research team understand the practical pathways and contextual background of each case, while cross-case analysis is used to compare the characteristics and applicability of different models. These methods reveal effective strategies adopted by the six cases in mitigating the spatial and temporal separation between food production and consumption and identify commonalities and differences in spatial design, service design, and system innovation. For instance, Quzhou Luming Park addresses energy consumption challenges by integrating agricultural production with urban public spaces and introducing productive crops; Shared Harvest Organic Farm and the Southern Philadelphia

High School Farm optimize sales models and purchasing methods; the Clover Nature School and Patchwork Urban Farms enhance the resilience of urban food systems; and Farm Urban focuses on waste management and resource recycling. These cases provide valuable insights for the sustainable development of urban food systems in China. If properly guided by designers, self-organized urban agriculture holds great social and ecological potential (Wu, 2022).

4. Result-"Concentric Ripple" model

Building on the above analysis, this study proposed the "Concentric Ripple" model to address the challenges of spatial and temporal separation between food production and consumption in China's urban food system. This model structures a resilient and sustainable urban agriculture system through a three-tier framework consisting of the urban core, urban communities, and peri-urban areas. While incorporating the strengths of global urban agriculture practices, the model adapts to different contexts to enhance its applicability. By optimizing the flow of capital, resources, and information, it establishes a highly efficient and collaborative agricultural network. See figure 1 for the "Concentric Ripple" model.

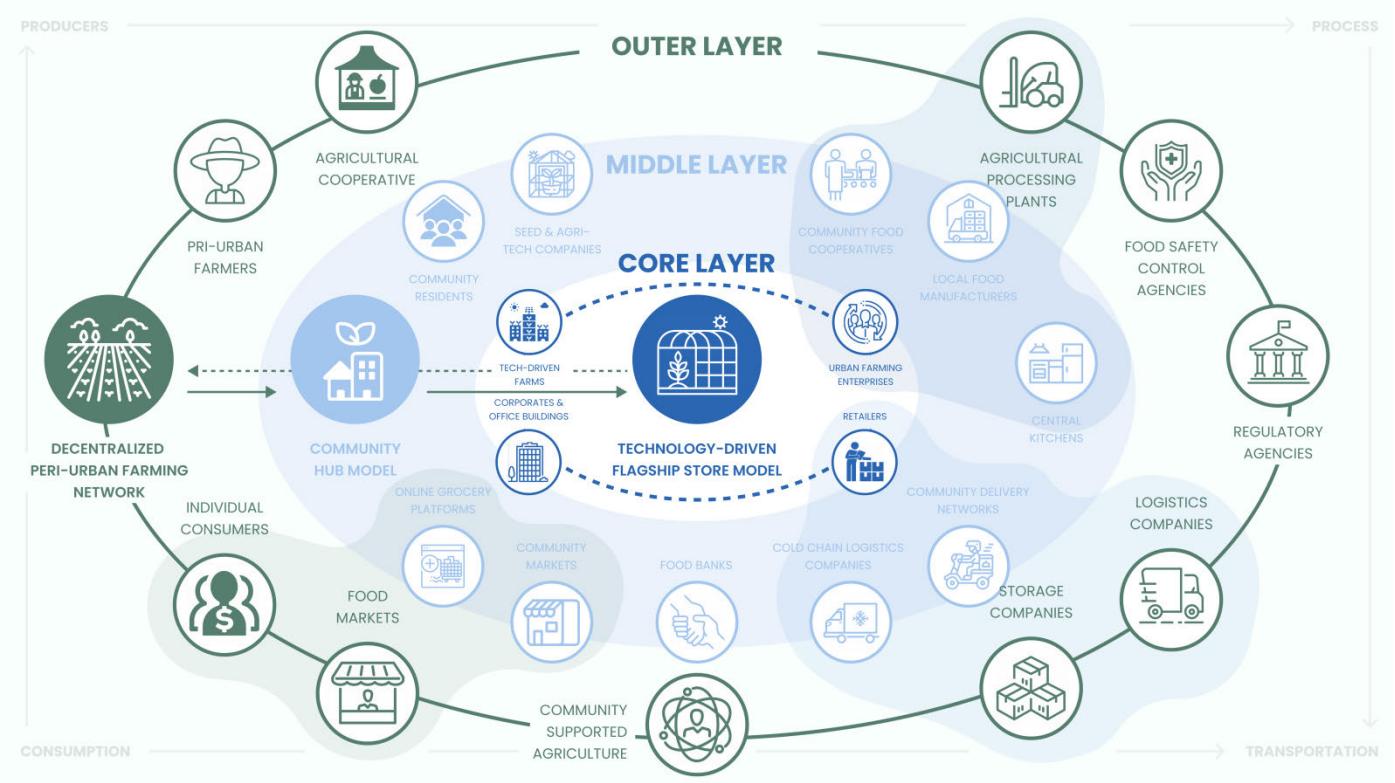

Figure 2. The system diagram of the 'Concentric Ripple' model illustrates the stakeholders within the core, middle, and outer layers. Each layer is structured according to the six key stages of the food 'production-to-consumption' cycle, with dynamic interactions between them, collectively shaping a more resilient urban food system.

4.1 Urban Core: Technology-Driven Flagship Store Model

At the innermost layer, flagship stores serve as showcases for agricultural technology and sustainable living concepts. These stores adopt modern agricultural technologies such as vertical farming, hydroponics, and closed-loop ecological systems to efficiently produce small-scale organic food within limited urban spaces, meeting the demand for healthy food while establishing a strong brand identity and attracting social resources.

Beyond production, flagship stores also function as education and engagement hubs, offering skills training, agricultural education, and sustainability experiences. Smart management systems gather consumer demands and market feedbacks, transmitting them to community and peri-urban areas to refine production and distribution strategies, creating a closed-loop interaction.

4.2 Middle Layer: Community Hub Model

Situated within urban communities, community hubs act as key intermediaries, linking peri-urban farms with urban consumers while serving as logistics, resource circulation, and education centers. Embedded in residential areas, campuses, and industrial parks, they establish a regionally integrated service network based on a point-line-plane approach, embedding food production in daily life.

These hubs handle food quality inspection, sales, and distribution while facilitating waste management by converting organic waste into compost, returning it to peri-urban farms. They also promote gardening toolkits and training programs, enhancing food system transparency.

Furthermore, consumer purchasing behavior and demand insights are transmitted across both inner and outer layers, allowing the system to optimize planting plans and distribution strategies at the production end while refining marketing and engagement strategies at the consumption end.

4.3 Outer Layer: Decentralized Peri-Urban Farming Network

The outermost layer functions as the production core, leveraging land and agricultural expertise for large-scale food production. A decentralized farming network ensures a stable material foundation, with grid-based management allowing flexible scheduling. Peri-urban farms supply food through two main channels:

- **Consumer-Direct Model (CSA-inspired):** Consumers pre-subscribe to farm produce, which is then delivered to households or schools via an optimized logistics system.
- **Centralized Distribution Model:** Fresh produce is transported in bulk to community hubs, where it is either sold or distributed.

In addition to production, peri-urban farms also function as agricultural training centers. Through collaborations with communities and schools, farming knowledge and techniques are disseminated, fostering urban-rural interaction and enhancing agricultural capacity at a broader societal level.

In conclusion, the “Concentric Ripple” model forms a highly integrated circular system by coordinating the flows of capital, materials, and information across three interconnected tiers. In the urban core, flagship stores utilize smart systems to collect real-time data on consumer preferences and nutritional needs. This information is aggregated at community hubs, where it is combined with sales and logistics data, then transmitted to peri-urban farms to guide adaptive crop planning and precision agriculture.

Community hubs serve as pivotal intermediaries linking production and consumption. They manage logistics and distribution while processing organic waste into compost, which is returned to peri-urban farms—thus closing the material loop. Peri-urban farms, as the primary

production base, apply grid-based management to ensure flexible scheduling and supply stability.

Capital, facilitated by government subsidies, product sales, and brand partnerships, flows across all three layers, supporting long-term economic sustainability. This multilayered, bidirectional framework transcends the single-function limitations of traditional urban agriculture, demonstrating enhanced adaptability, responsiveness, and scalability.

5. Conclusion

This research contributes to the field of food ethics by introducing the "Concentric Ripple" model—an innovative and practical framework for reconstructing resilient urban food systems. The model integrates three interdependent layers—peri-urban areas, urban communities, and the urban core—to address the spatial and temporal disconnect between food production and consumption, offering a systemic solution for sustainable urban development.

Moving beyond the single-function paradigm of traditional agriculture, the model embeds food production within urban ecological and socio-cultural contexts. It coordinates capital, material, and information flows across all layers to form an integrated circular system. In the peri-urban layer, a decentralized farming network enabled by grid-based management and technology supports large-scale organic food production. Community hubs serve as centers for logistics, distribution, and resource recycling, linking producers and consumers while enhancing transparency and civic engagement. At the urban core, flagship stores utilize vertical farming, hydroponics, and closed-loop systems to facilitate efficient, small-scale food production while building brand identity and attracting social capital. These layers interact through bidirectional feedback loops, collectively creating a responsive, adaptive, and closed-loop urban food network.

Continued technological innovation and cost reduction will further enhance the model's adaptability and scalability. Its multifunctional structure allows for context-specific customization, making it suitable for both dense megacities and smaller urban areas. To realize system-level transformation, three leverage points are critical:

- Land-use policies and spatial planning frameworks that support peri-urban agriculture and empower local governance bodies;
- Digital infrastructure that enables real-time integration of production, distribution, and consumption data;
- Community-based incentive mechanisms and educational initiatives that sustain long-term citizen participation.

Despite its promise, the model faces several implementation challenges. Effective cross-layer coordination and real-time information exchange demand robust management mechanisms, particularly in multi-stakeholder settings. Economic sustainability remains a concern, as high initial investment costs may hinder large-scale adoption; attracting long-term capital and ensuring financial self-reliance are essential. Additionally, maintaining consistent community engagement is uncertain and will require targeted incentive structures, participatory governance strategies, and supportive policy frameworks. Future research should explore these pathways to enable a more inclusive, resilient, and sustainable urban food system.

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Sensory Dimensions and Ethical Challenges: Rethinking Technology in Contemporary Food Art

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INTRODUCTION

As technology continues to reshape food and design, ethical concerns regarding safety, authenticity, and cultural significance have become increasingly pressing (Behrokh Mohajer Maghari, 2011). While artists experiment with innovations such as genetic modification and 3D printing, these advancements also raise critical questions about their impact on food's sensory and social value. Works such as Enrico Becker and Matt Harris's *GMF fruits* (2015) and Open Meals' *Eight-bit sushi* (2019) exemplify this tension. Do these technological interventions expand the artistic potential of food, or do they risk detaching it from its cultural roots? This study examines how artists, through works by HE+HU (2022), Bompas & Parr (2014), Jinhyun Jeon (2018), and others, navigate the balance between innovation and ethical responsibility, advocating for a more conscientious approach to food-based art.

Figure 1. Work Selection for Case Study

• *ELECTRONIC+FRUIT WALL*, HE+HU

• *STIMULI x rndg*, Jinhyun Jeon

• *P.O.TH.A.A.VFB*, Dieter Roth

• *Flavour Fireworks*, Bompas&Parr

CASE STUDY

We've selected several works focused on real food, created by iconic '90s artists and emerging talents from the past decade (see Figure 1). They are:

- ***Electronic+Fruit Wall***, HE+HU, 2022, Fruits, LED;
- ***Stimuli x rndg***, Jinhyun Jeon, 2018, Ceramic;
- ***P.O.TH.A.A.VFB***, Dieter Roth, 1968, Chocolate, Birdseed;
- ***Flirting Goblets***, HE+HU, 2017, Wine Glass, Feather Device;
- ***PH Series***, HE+HU, Fruits, Vegetables, pH Reagents;
- ***Flavour Fireworks***, Bompas & Parr, 2013/2014, Fruit Scent, Edible Confetti, Fireworks;
- ***Soul City (Pyramid of Oranges)***, Roelof Louw, 1967;
- ***Creation***, Jenifer Rubell, 2019, A buffet-style performance art piece made of massive amounts of food;
- ***Stoke***, Anya Gallaccio, 2014, Melting chocolate to coat a room for interaction.

METHOD

Classification	Work Title	Artist or Designer	Vision	Touch	Hearing	Smell	Taste
Light diets	Electronic+Fruit Wall	HE+HU	😀				
	Soul City	Roelof Louw	😀			😀	
	Loaf	Laila Gohar	😀	😀		😀	😀
	PH Series	HE+HU	😀				
Heavy diets	Flavour Fireworks	Bompas&Parr	😀		😀	😀	😀
	P.O.TH.A.A.VFB	Dieter Roth	😀				
	Flirting Goblets	HE+HU	😀	😀			😀
	Stimuli x rndg	Jinhyun Jeon	😀				😀
	Creation	Jenifer Rubell	😀			😀	😀

Table 1. Classification of Works and Sensory Statistics

① The five senses are our most primal way of experiencing the world—and the most essential way we engage with food. Using them as a lens, we break down food art, drawing on aesthetic theories from Susanne K. Langer, Roger Fry, and Clive Bell to ground the analysis in its core essence.
② Light and heavy diets are basic food categories—one linked to health, freshness, and ease, the other to high energy and indulgence. We use this contrast as a lens to analyze food art (see Table 1).

FINDING

① For the public, this framework (see Table 2) makes food art easier to understand by linking its interpretation to personal experience. It brings food art closer to the audience, sparking deeper reflection on the self and reality.
② For young artists and designers, embracing new technology doesn't mean abandoning old techniques—it means evolving them. This study reinterprets traditional methods by using sensory interplay to amplify perception, much like how digital technology enhances artistic creation today. In the digital age, this approach offers another way for tradition to remain relevant, proving that technology isn't the only future for art and design.
③ For seasoned curators and art professionals, this framework allows food art exhibitions to be presented in a way that feels more grounded in real life, better reflecting the true essence of food itself.

Framework of food art

Deconstruct food art by types of food

Light Diets

Cooking Behavior :
Reduce oil and seasoning use for a healthy, balanced diet.

Element:	**Method**:	**Exhibition**:	**Meaning:**
● Use one or up to three elements. ● Use eco-friendly or recyclable elements. ● Use easily accessible or unprocessed elements.	● Use simple creation and design methods, such as repetition, stacking, and arrangement. ● Create or design with handmade or traditional tools.	● The final work presents a comfortable and light visual character. ● The final work is small in size, easy to display.	● Reflect the relationship between humans and nature, and its impact on the environment. ● Envision the future of food or offer new sensory experiences through ordinary foods.

Heavy Diets

Cooking Behavior :
High-calorie, unhealthy diet with excessive oil and seasonings.

Element:	**Method**:	**Exhibition**:	**Meaning:**
● Use more than three elements. ● Use processed or artificially made elements. ● Use high-cost elements.	● Use complex creation or design methods, such as concentration, explosion, and fusion. ● Design or create using emerging technologies or interdisciplinary methods.	● The final work delivers an impactful visual effect. ● The final work is large and requires a controlled display environment.	● Reflect the real issues food faces in society. ● Explore communication issues between individuals, nations, and regions.

Table 2. A Deconstructive Framework for Food Art Categorized by Light and Heavy Diets

CONCLUSION

This study uses a sensory approach to analyze food art, drawing on aesthetic theories from Langer, Fry, and Bell, and utilizes the concept of light and heavy diets to create a framework for understanding food art from sensory and cultural perspectives. The study shows that this framework makes food art more accessible to the public by connecting it to personal experience. For young artists, it demonstrates how traditional techniques can evolve through sensory interactions with new technologies. For curators, it aids in presenting food art more authentically. This study balances tradition and technology, fostering deeper engagement with food art through sensory exploration. The framework will be further developed, and we invite arts practitioners to contribute to its refinement.

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Reflections on Food's Agency in the Process of Becoming Response-able and Relational Designers

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ABSTRACT | Designers hold the potential to support transformative ways of living by rethinking our engagements with food. Yet, food is often treated as substance—produced, manipulated, and consumed—neglecting its relationality. However, we propose to shift how we design and relate to the world, by embracing a relational ontology of food. This research investigates how food and its "strings of withs" (Boisvert, 2010)—as living organisms with processes, labour, and relations—can reshape designers' ways of being and relating, fostering capabilities to address environmental challenges and ethical entanglements. Through a participatory "soma design experience", 16 designers engaged in cooking, eating, and digesting to explore food's transformational capacity and how these processes can support our endeavours to become relational and response-able designers.
We reflect on three workshop anecdotes: massaging a cherry compote, making whipped coconut cream, and collectively eating fresh green bean soup in silence—each revealing food's embedded agency and relationality. Our methodology blends experiential engagement—with food, tools, and designers as eaters—with a "thick description" (Geertz, 1973) of interactions, transcriptions, and reflections. Findings highlight how eating's relationality fosters collectivity, vulnerability, and sensory connection, expanding our convivial human condition and opening pathways to engage deeply with our social and environmental responsibilities. By "turning our insides into the outside" (Mol, 2021), we propose design approaches rooted in embodied, response-able and relational practices, where even cherries can undress us.

KEYWORDS | relationality, food, participatory design, soma design, ethics.

1. Introduction

We all eat. Eating is an activity we perform every day. And what do we eat? We eat food, of course. Every day, food goes in and out of our bodies. Also, food has designed our bodies, habits, societies, and environment long before we were even humans (Steel, 2020). Yet, it is so intrinsically part of our everyday life that most of us cannot even see its effects or consider it the matter that makes up our lives, our thinking and our bodies (Groys, 2022; Probyn, 2004).

Consequently, our current ways of engaging with food, such as the substances we produce, manipulate, and consume, ignore the relational aspect of eating (Mol, 2008, 2021). Philosophical research into the relational self has mainly focused on the way we, humans, are constituted through relations with other humans as part of a web of social, cultural, economic, political and biological relations, reorienting toward "withness" and interdependency and away from individualism and autonomy (Boisvert, 2010). Paying attention to the *relationality of eating* supports this expanding intention as it acknowledges relationality inside us, with the world moving through and becoming us at every moment (Heldke, 2012; Mol, 2021; Van Daele, 2022).

We, with many others, argue that a relational ontology of food, moving away from the substance ontology, is needed to shift our ways of relating and, therefore, ethically designing with the "withness" of food and the "withness" of the world (Boisvert, 2010; Heldke, 2018; Shotwell, 2021). We approach ethics as an everyday doing that connects the personal to the collective and decentres the human (Puig De La Bellacasa, 2010) —ethics as a matter of becoming *response-able*, a question of 'inviting, welcoming and enabling the response of others' (Barad, 2006). Embedding acts of nourishment within design practices helps catalyze a broader ontological reorientation in Design—expanding its fields of study and enriching its processes through more relational and situated approaches (Hayes-Conroy & Hayes-Conroy, 2010; Heitlinger et al., 2024; Huybrechts et al., 2022; Rodríguez Alfonzo et al., 2024; Rodríguez Alfonzo & Huybrechts, 2025a). This brings us to our research question: How can food, as living organisms with their processes, labour, and relations, play a role in shifting the designer's ways of being and relating with the world? In doing so, we transform and expand our design processes as we embrace relationality, intimacy, and the messiness that comes with it.

This paper discusses a *designerly translation* of a self-ethnographic approach of the primary author to fieldwork, specifically the experience of making *caraotas en coco* (black beans in coconut milk) in *El Sinai* Community Kitchen in Caracas, Venezuela. This experience significantly influenced how we, as a research team, started to relate to food, research, and design[1]. This experience was translated into a communal cooking, eating, and digesting workshop at Budapest's 2024 Cumulus Design Conference[2].

In the following sections, we will describe, first, what we call a "food awakening"—an ethical rouse driven by deeply felt engagement with food—making *caraotas en coco*; second, its translation to a food-centred workshop and how, through its *soma design*—a process that alters our bodies, movements, subjective experience and values (Höök et al., 2019)—we were able to bring ourselves, our bodies and positions, as well as of the participants, to the table. Lastly, we will reflect on food's agency in the process of becoming relational designers through the analysis of participants' observations and interpretations during the workshop, drawing a "thick" description of the different layers of interaction (Geertz, 1973). We will do so through three anecdotes: making a cherry compote, massaging and crushing with our bare hands, making whipped coconut cream with all our body and a simple whisker, and collectively eating fresh green bean soup in silence.

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[1] The authors' approach to Participatory Design (PD) and Research focoused on cooking, eating and digestion processes was further developed in the PDC2024 conference proceedings: Rodríguez Alfonzo, 2024.

[2] *Gut feelings,* the workshop, was carried out in three different opportunities and contexts. It's first iteration, the one we describe in this paper, in Budapest and later in Caracas and Sibu. A more extensive description of the workshop was published in the PDC2024 conference proceedings: Rodríguez Alfonzo & Huybrechts, 2024.

2. *Caraotas en coco*. A "food awakening" in *El Sinai*

El Sinai is a precarious, self-built settlement in Caracas, Venezuela's capital. My fieldwork[3] in *El Sinai* consisted of days filled with cooking, eating and digesting. Days working in an improvised and poorly ventilated Community Kitchen where five women make lunch every day for 60 children from the neighbourhood. As a researcher, I was interested in learning about women's space transformation capacities using food as a medium. But, 'food was more than a capacity-building medium', I realized, eating beans and rice while Elvia shared her *caraotas en coco* recipe (Figure 1). This recipe was like a story containing many stories. It is a tale of longing, belonging, other waters and geographies, warmer weather, wind, other ways of relating with palm trees and food and the characteristic coconut flavour present in her life before coming to the city and being exposed to the precarity that comes with displacement.

"I'm not from here; none of us is from here. I am from the coast, close to the Orinoco River Delta. The Delta is filled with coconut trees, and we use it in most of our cooking, not the young and green coconut, the brown one; we let it ripe on the tree, and the taste is much more intense. My family likes to eat lowland paca in coconut milk, rabbit in coconut milk, iguana in coconut milk, coconut milk rice and black beans in coconut milk—caraotas en coco.
[Elvia, a mother from the Community Kitchen.]

Figure 1: The story of the connection between Elvia and the recipe. Drawing by Liisalota Kroon.

A week later, I brought six coconuts, and we made *caraotas en coco* together. Breaking, grating, squeezing, and massaging coconut, we shared our stories. Our hands helped our bodies process food, and sharing experiences enriched our understanding of one another, highlighting our similarities and differences, thereby strengthening our sense of togetherness. I had a "food awakening", which I am trying to account for here as we follow the "strings of withs" (Boisvert, 2010) this dish trails. It was a moment of becoming aware and being roused to the potentiality of food for embodied and expanded relationality, to travel in space and time, and to transform myself from within. This "food awakening", paying close attention to the process of making and digesting *caraotas en coco,* made me relate and think about design differently, as participatory in very detailed, small gestures, sensorial, and inevitably always collective, and ask about designers' attitudes needed to embrace response-able and relational design.

This expanded way of relating with food and food's capacity to shape caring, vulnerable, and affirmative designers is what we wanted to bring to the table at the Cumulus Conference through our participatory *soma design* exploration.

[3]This section has been written in first person by the FIRST author to provide insight into their position and experience at the study site. The author's decision aims to highlight the importance of personal experiences and sensitivities towards sense-making. This approach is consistent with Ballestero, Winthereik and Pink's (Ballestero & Winthereik, 2021; Pink, 2021) suggestion of incorporating different ways of knowing into research.

Figure 2: Plan drawing of the soil table and the aftermath of all the interactions. Drawing by Liisalota Kroon and Josymar Rodríguez Alfonzo.

3. Making Caraotas en coco. Translation from fieldwork to workshop.

In July 2023, we organized a food-centered workshop in Cumulus Budapest titled "Gut Feelings: An Edible Exploration of Participatory Design". Along with 16 designers, we cooked, ate, and digested a meal over a ground-level soil table (Figure 2). The workshop was informed by the making of *caraotas en coco* in *El Sinai* and the material precarity of this environment, as well as the small-gestured, sensorial collective engagements from our experience there.

The recipe was adapted to incorporate seasonal produce available in Budapest while considering the time, materials, and space constraints we encountered. Here, we align with Evan's (1997) interpretation of "translation as a translatory motion with no requisite of evenness and continuity; things can get bent, broken or lost on the way" as they move through different spaces. In translating the recipe to Budapest, we lost contact with grating and massaging fresh coconut. We bent the experience to incorporate a dessert that included whipping coconut cream and massaging seasonal cherries as a way to retain similarity to the material encounters from the original recipe.

3.1 Bringing my body and position to a "different" table

Designing the workshop was a process of bridging parts of me and my fieldwork with the new site, with Budapest. I arrived two days before the start of the conference. I went to fresh produce markets and tried recipe variations with seasonal beans. I made coconut milk at the hotel and gathered cooking tools from friends' and conference organizers' households. This process allowed me, as a researcher, to recognize my position as an outsider and gain awareness of myself as my body sensed and made sense of the socio-material conditions I was working with. It also reinforced the notion of design as a collective rather than an individual endeavour and as a relational experience.

Translating the making of *caraotas en coco* required situating and bringing myself to the table, which meant relating to the Community Kitchen in Caracas and the design conference in Budapest differently. As I enacted its instructions, I became aware of the expansiveness of the recipe as it adapted itself to a different context, stretching to hold more, growing its "strings of withs" to expand its relationality (Boisvert, 2010; Brandt et al., 2012)[4]. It showed how translation entailed building relations with local actors, markets, and venues and, thus, already in its local preparations, shifted the workshop set-up.

3.2 Bringing estrangement to the table

Designing the workshop was a process of translating my fieldwork and the Community Kitchen material conditions to a high-education setting, a design conference space and an international audience. A decision to confront the overly ordered, white, clean and modern classroom with a more grounded, earthy, messy and precarious reality. The workshop intended to make participants strangers to eating, remove learned etiquette and table manners, overcome cultural biases, and open ways to engage with all the actors involved, including food. The workshop made use of "making strange," a *soma design* strategy "where the underlying idea is that movements and experiences become more clear in our minds if we shift from habitual movements, so deeply ingrained in our habits that we cannot 'see' them anymore, into non-habitual, strange movements" and

[4] The expansiveness of the recipe is further developed in a forthcoming article: Rodríguez Alfonzo & Huybrechts, 2025b.

settings (Höök et al., 2019; Lindegren et al., 2023; Wilde et al., 2017).

The workshop invited designers, soil, water, cushions, buckets, camping stoves, bowls, plates, graters, knives, cutting tables, hand towels, cherries, coconut cream, lemons, spring onions, radishes, and fresh green beans to work together. The soil table created a setting to challenge what a "conference lunch" is and its hygienic, formal, ready-to-eat format. The conference participants and organizers were asked how life-affirming practices (cooking, eating and digesting) shape our design thinking, processes, institutions and academic settings. Minna, one of the participants, described it as messy and uncomfortable, a change in proceedings allowing for shared ideation.

"This was, especially at first, kind of uncomfortable. I usually teach in this room, but now it's a mess! You can feel it is different. So, it sets the stage for something different. In co-creation processes, we have to get people into an ideation mindset, which is difficult, but you cannot do it when you leave them in the same environment. So, when you make such a change in the proceedings on how we usually discuss things, it's uncomfortable, but if you get over that, you can get into a shared reflection space."
[**Minna, workshop participant.**]

Figure 3: Participant's intervention during the workshop. Drawing by Liisalota Kroon.

Minna mentions the need for estrangement in a design process, but between the lines, we can also read the need for time to bend ourselves to acknowledge and engage with something different (Figure 3). We usually eat sitting in chairs over a clean surface, but now we are on the floor cooking over dirt. Our bodies and minds can bend to difference, but it is uncomfortable. However, if you can work with it, you can design from a spacious perspective of yourself and others.

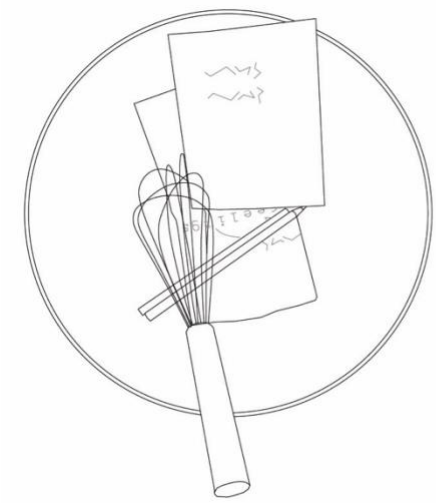
4. Three anecdotes: Reflections on food's agency and its embedded relational potential

The workshop invited the participants to work in pairs, transforming food while descriptively writing about their recipe enactments. This was a moment for collectively smashing, massaging, crushing, cutting, and squishing foodstuffs. After cooking comes eating, a process of transformation inside our bodies. Eating was a collective silent moment where we gave space to our insides to be an active participant. While eating, participants were encouraged to reflect on how, during the session, their senses expanded their understanding of design.

In this paper, we will describe and analyze three anecdotes leading to collective "food awakenings", two of which belong to the cooking moment: whipping coconut cream with a simple whisker and making a cherry compote with our bare hands. In contrast, the third anecdote travels through eating fresh bean soup. In the three cases, we will share the participant's comments pointing towards why we must pay attention to the relationality embedded in eating and foster the collectivity, vulnerability, and pleasure of a deepened relationship with food (Mol, 2021).

4.1 Making whipped coconut cream with our whole body and a simple whisker. Describing to stress the present with-ness and without-ness.

We intentionally focused on «doing». While cooking, we asked participants to write to describe how their senses relate to their companions and their doings, human and more-than-human. In Gwendolyn's recount, three points of attention come across (figure 4):

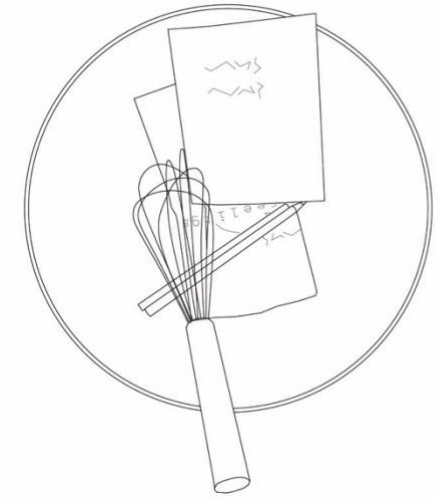


"There was this moment of familiarising with the tools. So first, okay, let's start. And then it becomes faster and faster and very rhythmic. And there's tiredness, so changing, doing it in another way or using the other hand. We get dirty. Dirt gets in the tool. ***It is splashing and going off the bowl,*** *then they're scratched back into the bowl, becoming a whole thing again. The rhythm of beating becomes slow and fast and slow and fast, and he realises when he gets tired and when the bing, bing, bing gets slower. And there's the smell (she sniffs inside the bowl) if you put your nose in there. So I think it's a very* ***bodily experience.***"
[**Gwendolyn. Workshop participant.**]

Figure 4: Participant's intervention during the workshop. Drawing by Liisalota Kroon.

1. The use of the progressive verb tense (*ing*) and active voice not only for her actions and sensations but also for those of the coconut cream, as it splashed and made her dirty, and the whisker, as it made her tired and demanded more work from her body.
2. Whisking constantly creates a moment of familiarisation with the tool and builds an intimate relationship; with less friction, they grow accustomed to each other as the action is repeated. Whisk and body work together, taking into consideration their limitations (available energy, experience) and capacities.
3. "It is a very bodily experience". Her body needs to work intimately and in tune with whisk and coconut cream. The action drives her focus, makes her sweat, and helps her know her body better. The cream splashes and modifies her, making her dirty. She and the whisk together turn the cream from liquid to creamy and stable.

These points of attention surface as design reflections from the participants (Figure 5):



Gwendolyn: *I felt the* ***relationship between and with food and tools*** *because these are low-tech. The kind of tools in which we prepare the food and it's not like we put it in a mixer and here, done. Everything was more time-consuming, like using the mortar and the whisker and tasting the cream to see if it was ready.*

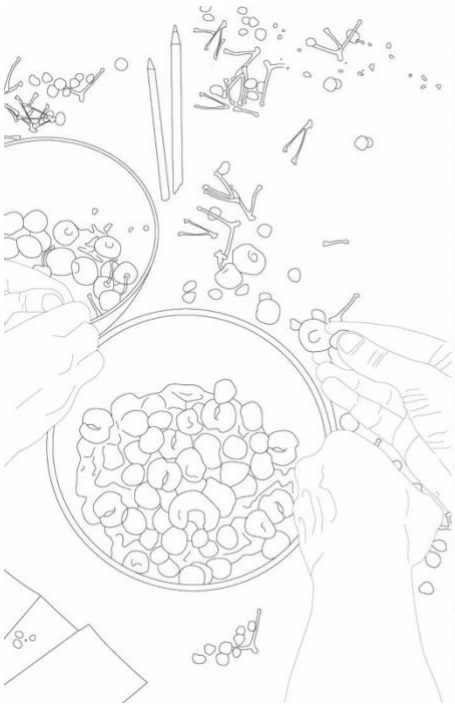
Bert: *Something we often do as designers is make things easier for us. We kind of get rid of the agency of other beings or other actors. So,* ***I feel that we always design to make it easier while disconnecting us.***

Figure 5: Participants discuss actors' agency and relationality. Drawing by Liisalota Kroon.

Making whipped coconut cream with your whole body and a whisker is a weaving of agencies, putting forward a sense of neediness, of interdependency. We cannot whip cream with our bare hands. Our relation with the intermediary, a design object, the whisker, is deeply felt. It requires our time, energy, attention and body. The whisk becomes an extension of you. This contrasts with a standing mixer and our human drive to make things more efficient "while disconnecting us". This was the first "food awakening", arousing a reassessment of our design practices and prompting the following questions: What are we leaving out when designing for efficiency and productivity? What do we allow *in* when designing to engage with all our senses? How does our approach to design shift when we take the whisker and the coconut cream seriously?

Figure 6: Whipping coconut cream and assembling the dessert—photos by Eumilis Arellano.

4.2 Making a cherry compote, massaging and crushing with our bare hands. Surrendering, stripping mind and body.



Gerardo: *We got the messiest part. We got the cherries and had to smash them with our hands. We smashed it. Today was the day I chose to come in white (laughs). I didn't want to mess up my shirt, so I had to take it off. And I was like: Aahh!! Now I am relaxed. This was a great way to break from the conference.*

Andrea: *We realised that the cherries made him undress! (laughs). He literally said he had to undress, mind and flesh. In the beginning, we were like: Oh my god, we are gonna get so dirty! We were taking care in the beginning, but then, at a certain point, it was just so nice (hand gestures of feeling the cherries between the fingers). And I was thinking why, if I were at home, I would use a knife and make it differently. So, it feels like, wow, it's so playful, and you feel the best, feel the most with your hands. (...) What I feel is that the non-human agency was very present. We could feel that food had a lot of agency here because we were touching things, and he had to take out the clothes.*

Gerardo: I had to strip myself!

Andrea: *Come on, a cherry has this power! I was very impressed that people were relating to this in a totally different way, and I could imagine the non-human being differently.*

Figure 7: Participants discuss actors' agency and relationality. Drawing by Liisalota Kroon.

Gerardo and Andrea worked together with the cherries (Figure 8). In their account, there is first resistance, refusal to use their bare hands, refusal to engage and be messy. In a conference setting, the cherries showed their power over this particular human, afraid of the implications of being dirty, so much so that he opted for stripping, removing his

clothing, but also stripping his mind, surrendering. The cherries assisted him in scraping his rigid conference persona and relaxing. In this situation, the cherries loudly and staining reveal their power, their agency over us. Such experience expands how we relate *with* cherries, *with* food, and *with* others, helping us embrace vulnerability. It also facilitated a reassessment of their senses and the pleasure and sensuality that come with it. They questioned why this experience was so rare. While reflecting together about all these layers or intermediaries hindering our senses, a second "food awakening" aroused us into inquiring: How might we design if we dare to embrace a whole array of ways of knowing and making that are more tactile, smelly, tasty, and loud?

Figure 8: Pitting and massaging the cherries—participant's notes. Photos by Eumilis Arellano.

4.3 Eating green bean soup in silence. Turning ourselves to the inside.

*"I remember the metallic sounds of the spoons on the plates. Also, the sounds of mastication. I felt weird at first, but afterwards, **I felt relieved** from socialising and conversing with others."*
Emma, conference participant.

*"I liked the silent part and, I think, also as a facilitator, what I take from this is that we should have more silent exercises in workshops because that **gives time – time to digest – and to reflect** and to be mindful and concentrate on the food, concentrate on the tasks."*
Minna, conference participant.

*"It's actually an exercise in mindfulness. When we do silent eating, we are able to **reflect on what is happening** inside **our bodies and our mouths**, what we do, and what we feel."*
Fanny, conference participant.

"For me, it is about having time to process."
[Sophie, conference participant.]

Figure 9: Participants discuss the relationship between digestion and design. Drawing by Liisalota Kroon.

In these four accounts, the participants reflect on the experience of collectively eating in silence (Figure 9), muting the outside. Muting human voices and their need to be attentive to what others say gave them permission to pay attention to other sounds as they become loud, as we allow them to take space. Eating in silence and paying attention to food and how it traverses our insides allowed them to reflect on the things and processes we give time and space to and those we don't. It shifted attention to the sensations in their bodies and mouths, as well as other less loud or self-evident processes, actors and situations. This gave space to our third "food awakening": Turning ourselves to the inside might facilitate our own process of becoming attentive and responsive to the more-than-human world in our design processes.

Participants chew on the time needed to digest, literally and metaphorically. And the pressure we have in our everyday lives to move on, give feedback, and immediately know the answers to any questions. As participatory designers, we constantly ask for immediate responses from participants. This was evident in the workshop when we asked, 'How can the process of digestion inform design?' As participants were physically moving food through their bodies, it was clear how, *as digestion was still taking place and still happening, it was not possible to voice out a conclusion.* Syncing, becoming attentive to our digestion, its processes and the time it takes, can give us space to form inclusive, affective, caring and joyful ideas.

Figure 10: Eating in silence while reflecting on the relationship between digestion and design—photos by Eumilis Arellano.

5. Conclusions. "Food awakenings" guiding response-able and relational design.

Participants explored socio-material and relational sensibilities as they cooked, ate and digested together. While doing so, they raised questions about their practices and ways of living, acknowledged the work ahead, and started crafting visions to foster ethically responsible design approaches to confront current social and environmental challenges. Through "food awakenings", designers and researchers became "entangled with multiple sensitive experiences and affective histories" (Pihkala & Karasti, 2022), intending to open difficult conversations, not to seek answers but to pose meaningful open questions.

Through "food awakenings", designers and researchers reflected on (1) digestion in relation to the time needed to process materials and meanings and the need to refrain from immediate response, giving space to time. (2) the possibility of becoming more attentive to more-than-human actors in our design processes by attuning to our own bodies, specifically to digestion. (3) Design objects, specifically tools, are ambivalent; they can enable, facilitate, or disconnect. This revelation asks for a reassessment of our practices: What are we leaving out when designing for efficiency and productivity? What do we allow in when designing to engage with all our senses? And lastly, (4) we nibbled over the need to surrender, strip our minds and bodies to embrace a whole array of ways of knowing and making that are more tactile, smelly, tasty, and loud.

Intentionally and whole-bodily engaging with the story of Elvia and *El Sinai*, *with* coconut, *with* beans, *with* whisk and *with* cherries brought into dialogue ethical concerns and our response-ability as designers to acknowledge more-than-human relationality, questioning how they could enable matters to be explored in different ways, across contexts, devising ways to align to "wider ecologies of practices" (Pihkala & Karasti, 2022). Following the notion of "strings of with" so intimately embedded in food, engaging with its times, processes and matter in a relational way, helps us reflect on the "with-ness" of food and the "with-ness" of the world. Giving us "more opportunity to see nuance, shade,

degree, and alternative interpretation" (Boisvert, 2010) in designerly endeavours and foregrounds a way of living that "embraces the complexity of the world in which we are making decisions" (Heldke, 2018).

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THE FUTURE IS FLUID: DESIGNING FOOD FUTURES THROUGH COLLABORATIVE 3D PRINTED EDIBLES AND CERAMIC ART.

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ABSTRACT | This paper examines how multidisciplinary collaboration in design enhances experiential outcomes in food design, art, and science, particularly through the lens of Food Serenity. This concept describes the state of calm and stimulation achieved when a balance of neurochemicals like serotonin and dopamine enriches our interactions with food (Tarman & Werdell, 2014). Using the co-design and production of a ceramic vessel for Koli, a Michelin-starred restaurant in Monterrey, Mexico, as a case study, this research demonstrates how design can foster mindful consumption and environmental awareness while providing a framework for food born from science and innovation. Developed by the Futures Design Lab at the Monterrey Institute of Technology and Higher Education (ITESM) in partnership with Casa Celeste and Forma Foods Lab, the project sets the stage for Koli's autumn 2024 dish, El betabel que quiso ser carne ("The Beet That Wanted to Be Meat").

This project exemplifies "design for territories," grounding the culinary experience in the cultural and ecological narratives of Northeast Mexico. It shows how food design can reflect the principles of Food Serenity by promoting local ingredients and sustainable practices. The design encourages mindful consumption, fostering a deeper connection between the diner and the environment. Furthermore, it serves as a platform to explore how integrating scientific, artistic, and design approaches in food innovation can create

immersive experiences that enhance consumers' appreciation of the food's origins, sustainability, and the potential of scientifically produced foods.

A central element of the project is The Future is Fluid, a ceramic vessel crafted specifically for the dish. This vessel functions as a powerful metaphor for sustainability and transformation within food systems. Through its design, the vessel blends form and function into a visually cohesive and conceptually rich culinary experience. Additionally, the principles of chaos theory, particularly Chaotic Flows, influence both the 3D food printing process and the tableware's design. This fusion creates a dynamic interplay between predictability and adaptability, enhancing the overall dining experience (Molina et al., 2024).

The plate also features celestial and molecular motifs, such as a star map commemorating Koli's Michelin star award and the molecular formula of essential elements in plant-based proteins. These symbolic elements bridge the organic and technological realms, enriching the dish's narrative while reinforcing the principles of Food Serenity.

The impact of multidisciplinary collaboration in food design points toward a future aligned with Food Serenity principles, where thoughtful design fosters harmony, sustainability, and connection in the culinary experience. By integrating disciplines like material science, technology, art, and design, this approach enables a deeper exploration of food narratives. Looking forward, this model of interdisciplinary engagement positions designers as strategic leaders in the food sector, empowering them to redefine culinary boundaries and advocate for deeper, sustainable practices.

KEYWORDS | food design, sustainability, multidisciplinary collaboration, 3D food printing, and Mexican cuisine.

1. Introduction

Food design has emerged as a multidisciplinary field that bridges culinary arts, design, and science, emphasizing the creation of experiences that are as meaningful as they are functional (Schwarz et al., 2022). By examining the cultural, ecological, and sensory dimensions of food, food design enables us to rethink our consumption habits and their broader implications for sustainability and mindfulness (Rockström et al., 2009). The discipline thrives at the intersection of creativity, science, and cultural storytelling. It involves the deliberate integration of artistic expression, scientific innovation, and sustainable practices to shape the way we interact with food, not just as nourishment but as an experience. Over the past decades, food design has evolved from focusing on aesthetic considerations to becoming a critical tool for addressing global challenges. The significance of multidisciplinary collaboration has come to the forefront, highlighting how the convergence of diverse expertise—spanning design, material science, culinary arts, and environmental studies—can lead to groundbreaking innovations. By combining these perspectives, food design emerges as a powerful medium for fostering mindful consumption, ecological awareness, and cultural preservation.

The intersection of design, science, and art is particularly significant in advancing the principles of Food Serenity—a concept that advocates for mindful consumption, sustainability, and a deeper

connection to the origins of our food. This framework underscores the potential of design to create immersive culinary experiences that inspire ecological awareness and foster a sense of harmony. As the demands of modern society continue to evolve, food design offers a platform to explore innovative approaches that integrate tradition, technology, and sustainability. The integration of design and science is not just a methodological approach but an essential pathway to achieving the broader goals of food design, such as promoting sustainability, enhancing sensory experiences, encouraging mindful consumption, and fostering cultural and ecological connections. In the case of the ceramic vessel designed for the autumn 2024 dish, El betabel que quiso ser carne ("The Beet That Wanted to Be Meat"), this approach enables a deeper understanding of the relationship between food, its environment, and the overall dining experience.

The multidisciplinary collaboration involves key actors from both scientific and creative disciplines. On the scientific side, Forma Foods, a lab dedicated to exploring innovative food technologies, played a critical role in designing plant-based solutions that align with the principles of sustainability and culinary innovation. The creative dimension of the project is led by the Futures Design Lab (FDL), a research group at the Monterrey Institute of Technology and Higher Education (ITESM), which focuses on the intersection of design, sustainability, and culture. FDL was responsible for conceptualizing and designing the ceramic tableware that would enhance the sensory experience of the autumn 2024 dish. Casa Celeste, a renowned ceramic studio, contributed its expertise in material design and craftsmanship, bringing the conceptual designs to life through precision and sustainable materials. Finally, the Michelin-starred restaurant Koli acted as the culinary partner, incorporating the design of the tableware into the final dining experience and ensuring the seamless integration of the artistic, scientific, and culinary components. Together, these actors illustrate the power of interdisciplinary collaboration, each contributing their unique expertise to create a harmonious and innovative culinary experience.

In this context, the Futures Design Lab at the Monterrey Institute of Technology and Higher Education (ITESM) has partnered with Casa Celeste and Forma Foods to conceptualize, design, and produce a ceramic tableware piece for Koli, a Michelin-starred restaurant in Monterrey, Mexico. This project, anchored in the principles of Food Serenity, including mindful consumption, the balance of neurochemicals like serotonin and dopamine, and a deep connection to local ingredients and sustainable practices, culminated in the creation of a ceramic vessel specifically designed for the autumn 2024 dish, El betabel que quiso ser carne (Tarman & Werdell, 2014) . Developed under the name The Future is Fluid, this tableware piece encapsulates the synergy of art, science, and sustainability, illustrating how food design can bridge cultural narratives, technological innovation, and ecological stewardship.

This paper examines the transformative potential of multidisciplinary collaboration through the lens of food design, focusing on the conceptualization, design, and production of The Future is Fluid. It delves into the intricate processes that defined this project, highlighting the role of scientific and artistic approaches in creating immersive culinary experiences.

Through an exploration of the multidisciplinary efforts behind The Future is Fluid and its integration into the dish El betabel que quiso ser carne, this paper offers insights into how design can transcend aesthetics to shape narratives deeply rooted in sustainability and cultural identity. As we move towards a future where collaboration becomes increasingly necessary, the potential of food design

to redefine the boundaries of culinary innovation is exemplified, showcasing how cross-disciplinary efforts can drive transformative change.

2. Cultural and ecological narratives: Aesthetic and symbolic dimensions in design

The ceramic vessel, titled The Future is Fluid, serves as more than a functional object—it is a profound narrative artifact that encapsulates cultural, ecological, and technological stories of Northeast Mexico. Through its intricate design, the vessel bridges the organic and technological realms, creating a multidimensional narrative that deepens the connection between food, culture, and sustainability.

The vessel's narrative elements amplify its impact, elevating it beyond its material presence. By engraving celestial coordinates and symbols from organic chemistry, the design constructs a bridge between the natural world and the technological advancements underpinning the dish. This duality emphasizes adaptability and transformation, mirroring the evolving nature of food systems in response to environmental and cultural shifts. Moreover, these design choices resonate with the principles of sustainable innovation, reminding diners of the interconnectedness of food, place, and global responsibility.

The project's focus on "design for territories" further underscores the importance of local ingredients and sustainable practices in its conceptualization. By rooting the culinary experience in the cultural and ecological stories of Northeast Mexico, the vessel not only supports the principles of sustainable gastronomy but also fosters a profound connection between the diner and the region's rich history. This approach highlights how thoughtful design can serve as a medium for storytelling, creating a dialogue that transcends the plate and engages the diner in a narrative of place, culture, and future possibilities.

3. Multidisciplinary approach and cultural integration in food design

The project "The Beet That Wanted to Be Meat" began with a collaboration between Forma Foods and Koli, driven by the realization that the culinary experience lacked a visual framework to contextualize the dish. This gap led to the co-design and conceptualization of a ceramic vessel, one that would not only complement the dish but also reflect the cultural and ecological narratives of Northeast Mexico. The design process, shaped by the intersection of science and art, integrated material innovations with cultural storytelling. Ultimately, the creation of the vessel aimed to serve both functional and symbolic purposes, embodying the broader principles of Food Serenity and enhancing the overall dining experience.

The success of this project lies in its multidisciplinary approach, which brought together designers, material scientists, chefs, and sustainability experts, each contributing distinct expertise to the endeavor (Arús-Hita et al., n.d.). This collaborative framework was essential in addressing the complex challenges inherent in food design, particularly in ensuring the vessel's functionality and sustainability while preserving its aesthetic and narrative integrity. By emphasizing the experiential aspects of food, designers can elevate gastronomy into an immersive cultural journey (Pine & Gilmore, 1999).

The value of interdisciplinary collaboration in food design is evident in the way diverse expertise combines to produce innovative, culturally significant outcomes (Reficco et al., 2018). By integrating art and science, the collaboration behind this initiative highlights how a collective approach can deepen the impact of culinary experiences, making them both meaningful and contextually rich (Rittel & Webber, 1973).

4. The role of design in food innovation

Design holds a pivotal role in food innovation, serving not only as a practical solution to functional challenges but also as a powerful medium for storytelling, cultural expression, and experiential engagement (Helmut Traitler et al., 2014). In the case of The Future is Fluid, design was the cornerstone that united sustainability, technological innovation, and cultural relevance to create an immersive dining experience. By addressing both tangible and intangible aspects, the project demonstrated how design could elevate food from mere sustenance to an expression of meaning and purpose.

One of the defining aspects of the design process was its integration of advanced methodologies to harmonize aesthetic, functional, and cultural objectives. For example, the plate’s eccentric axis and dynamic geometries were carefully crafted to evoke a sense of fluidity and transformation—an intentional reflection of the adaptability inherent in sustainable food systems (Tait, 2021). These design choices were not arbitrary; they embodied the underlying principles of resilience and change that are central to ecological and culinary innovation. By marrying form and function, the design contributed to a dining experience that was not only visually stunning but also thought-provoking, challenging diners to consider the broader implications of their food choices.

Beyond functionality, the design was imbued with symbolic meaning, enriching the narrative of the dining experience. The celestial map engraved on the plate, commemorating Koli’s Michelin star achievement, created a metaphorical connection between the earthly and the cosmic. This element invited diners to reflect on the interconnectedness of human creativity, natural systems, and technological progress. The celestial map was further emphasized through molecular motifs, bridging the realms of science and art and highlighting the interplay between organic and technological elements in modern food systems. The choice of gold in these motifs added sophistication and timelessness, aligning with the overarching narrative of the dish. Gold, chosen for its aesthetic harmony with the rose tones and for its historical associations with value and transcendence, embodied the fusion of tradition and innovation. Additionally, gold’s conductivity underscored the idea of energy and progress, reinforcing the project’s forward-thinking nature.

The plate's design, coupled with the ceramic vessel housing the dish, harnessed material storytelling to communicate cultural and ecological narratives. The color gradient on the plate—from beetroot magenta to soft pink hues—symbolized the balance between tradition and modernity in Mexican gastronomy, with magenta referencing the region's cultural perception of meat and its masculine associations, counterbalanced by the feminine-coded pink. This design choice contributed to the project's concept of a "new meat," one that challenges traditional gendered food norms while embracing plant-based alternatives. The vessel itself mirrored this symbolic use of color and form, incorporating earthy tones that evoke the plant-based origins of the ingredients, while gold accents represented technological advancement. Its intentionally distinct form, which evokes transformation and adaptability, serves as a metaphor for the future of food systems—fluid and responsive to evolving environmental and social dynamics. The combination of these materials and forms tells a story not only through the function of the dish but also through its aesthetic representation of sustainability, innovation, and a future-oriented vision of gastronomy.

Importantly, the design process was deeply collaborative, integrating expertise from disciplines such as material science, sustainability, and culinary arts (H. N. J. Schifferstein, 2016). This multidisciplinary approach allowed the design team to address complex challenges in food innovation, such as creating a plate that was visually striking, environmentally responsible, and capable of enhancing the dining experience. For example, the team optimized high-temperature ceramic processes to minimize energy consumption, showcasing how design can actively contribute to sustainable practices.

Ultimately, the role of design in The Future is Fluid transcended traditional boundaries, positioning it as a strategic tool for innovation and cultural storytelling. By integrating symbolic, functional, and sustainable elements, the project offered a holistic approach to food design that resonated on multiple levels (H. N. Schifferstein, 2015)—ecological, cultural, and technological. It demonstrated that design, when executed thoughtfully, has the potential to redefine our relationship with food, inspiring a deeper appreciation for the narratives and systems that sustain us (H. N. J. Schifferstein, 2016). Technological advancements, such as 3D food printing, provide innovative opportunities to integrate sustainable practices into food systems (Chen et al., 2024). Furthermore, by combining sensory and scientific insights, food design can create more meaningful gastronomic experiences (Spence, 2017).

This case study highlights the transformative power of design as an agent of change in the food industry. By fostering connections between disciplines, design not only solves practical challenges but also elevates food innovation into a medium for connection, reflection, and transformation. As we navigate the future of food systems, the lesson from The Future is Fluid underscores the need for design to remain at the forefront of efforts to create meaningful and sustainable culinary experiences.

dialogue that transcends the plate and engages the diner in a narrative of place, culture, and future possibilities.

5. Scientific and artistic integration

Scientific innovation was a fundamental pillar of ¨The Beet That Wanted to Be Meat¨ project, driving

much of its design and execution. One of the primary scientific principles applied was the concept of Chaotic Flows, derived from chaos theory (Ma et al., 2016). This principle, which explores the inherent unpredictability and self-organizing patterns found in complex systems, was crucial in both the creation of the ceramic vessel and the 3D printing of plant-based proteins. The chaotic flows concept influenced the intricate flow patterns that characterized both the surface of the ceramic plate and the texture of the food it contained. By drawing on advanced material science and computational modeling, the project team achieved a seamless integration of form and function, where the aesthetics of the ceramic piece and the textural qualities of the food were not merely decorative but essential to the overall dining experience (Alvarez & Trujillo-de Santiago, 2021).

Image 1: Forma Foods 3D printing.

In addition to the integration of chaos theory, the project made significant strides in the development of sustainable materials. The ceramic plate was crafted using compounds based on silicon and aluminum, materials that are abundant, low-impact, and easily sourced. These choices were made with sustainability in mind, reflecting a broader commitment to minimizing the ecological footprint of the project. Not only did these materials serve a practical function, but they also carried symbolic weight, reinforcing the cultural and ecological context from which the dish emerged. Furthermore, a beetroot-based glaze was developed through a series of rigorous experiments to provide an environmentally friendly, visually striking finish to the ceramic vessel. This glaze further emphasized the project's commitment to both scientific innovation and sustainability, highlighting how the material properties could support and enhance the artistic vision behind the design.

The integration of scientific and artistic elements in ¨The Beet That Wanted to Be Meat is a prime example of how these two domains can work in harmony to create something both innovative and meaningful. The dish itself features 3D-printed plant-based proteins, primarily derived from peas and beetroot. These ingredients were not only chosen for their ability to mimic the texture and flavor of meat but also for their environmental benefits. Peas and beetroot are sustainable crops, offering a reduced ecological footprint compared to traditional animal-based protein sources. This selection aligns with the broader principles of sustainability and innovation that permeate the entire project.

At the heart of this integration is the application of chaotic flows, a key component of chaos theory, which was utilized both in the 3D food printing process and in the design of the ceramic vessel. The

flow patterns derived from chaos theory created a dynamic interplay between predictability and adaptability in both the food and the vessel. The unpredictability of these flows in the design process highlighted the tension between the organic and the manufactured, between nature and technology. This approach reinforces the collaborative nature of the project, where the scientific processes underlying material selection and 3D printing methods were in constant dialogue with the artistic vision of the ceramic design, resulting in a harmonious fusion of both fields.

Ultimately, the integration of science and art in this project goes beyond aesthetic appeal or technical achievement—it speaks to a deeper, philosophical exploration of how innovation in one field can inform and enhance the other. Through this cross-disciplinary collaboration, the project demonstrates that science and art are not isolated spheres but interconnected forces that, when aligned, can create powerful and transformative experiences. This holistic approach is what makes the project not only a culinary innovation but a statement on the future of food design, sustainability, and artistic expression.

6. Designing connections: Storytelling, symbolism, and sustainability in The Future is Fluid

At the heart of The Future is Fluid lies a profound interplay between design, symbolism, and storytelling, creating an experience that is both visually striking and deeply meaningful. This project demonstrates how design can serve as a medium for narrative, connecting aesthetic form with broader themes of transformation, sustainability, and cultural reflection.

The concept of fluidity was central to the design process, serving as a metaphor for adaptability, evolution, and the boundless possibilities of future scenarios. The plate's distinctive form, featuring smooth concave and convex geometries set on an eccentric axis, embodied this theme with elegance and intentionality. This design choice was not only a visual representation of change but also addressed practical needs. The curvature of the plate ensured the seamless containment of liquids, merging functional utility with conceptual depth. The fluid, organic shapes symbolized the interconnected nature of sustainable systems and their capacity to adapt to shifting ecological and cultural landscapes.

Beyond its physical design, the project incorporated a rich tapestry of symbolism and storytelling that added layers of meaning to the dining experience. Celestial motifs engraved onto the plate celebrated Koli's Michelin star achievement, creating a metaphorical connection between earthly culinary excellence and the infinite cosmos. These motifs encouraged diners to consider their place within larger natural and universal systems, fostering a sense of interconnectedness and introspection.

Image 2: Image 2: Top view of The Future Is Fluid. **Image 3:** Image 2: Side view of The Future Is Fluid.

In addition to celestial imagery, the design featured molecular symbols for plant-based proteins, emphasizing the project's commitment to scientific innovation and ecological awareness. These elements highlighted the collaborative effort between culinary artistry and scientific research, demonstrating how food design can bridge diverse disciplines to create a cohesive narrative. The molecular motifs symbolized not only the technological advancements involved in crafting sustainable food but also the potential for innovation to address global challenges such as food security and environmental degradation (S R Jaeger & Hal MacFie, 2016).

The integration of storytelling within The Future is Fluid extended beyond symbolic elements to the dining experience as a whole. Each aspect of the project—from the materials used to the cultural references embedded in the design—was carefully curated to evoke a sense of connection and reflection. By blending form, function, and narrative, the design invited diners to engage with the broader implications of their food choices. It encouraged mindfulness about sustainability, cultural preservation, and the role of innovation in shaping future food systems (Choi & Blevis, 2010).

This harmonious blend of design and storytelling underscores the transformative potential of food design as a medium for cultural and ecological dialogue (Pollan, 2007). The project illustrates how thoughtfully crafted narratives can elevate dining experiences, transforming them into opportunities for reflection, education, and inspiration (Barham, 2003). Through its design, The Future is Fluid became more than a functional object; it was a vessel for storytelling, connecting diners to the values of sustainability, scientific progress, and cultural heritage.

Ultimately, The Future is Fluid exemplifies how design, symbolism, and storytelling can converge to create a multifaceted experience that resonates on both practical and emotional levels. By embedding deeper meanings into its physical form, the project demonstrated how design can transcend aesthetics to foster meaningful connections between individuals, their environment, and the broader world. This approach serves as a blueprint for future endeavors in food design, showcasing the power of narrative to inspire transformative thinking and action in the realms of sustainability, culture, and innovation (El Bilali, 2020).

7. Expanding collaboration beyond design

Collaboration was a defining pillar of The Future is Fluid, extending far beyond the boundaries of traditional design practices. This project exemplified how multidisciplinary teamwork, encompassing chefs, food scientists, and designers, can lead to groundbreaking innovations that harmonize sustainability, technology, and cultural storytelling. By engaging diverse stakeholders, the project highlighted the potential of collaborative efforts to reshape food systems and foster a deeper understanding of the interconnected challenges facing our world (Thompson, 1993) .

At the heart of this collaboration was Forma Foods, whose expertise in plant-based protein technologies played a crucial role in developing a dish that mirrored the texture, flavor, and sensory experience of meat. This achievement was not merely a technical feat, but a demonstration of how culinary science can align with sustainability goals. By utilizing plant-based ingredients, the project addressed pressing issues such as reducing the environmental footprint of food production, conserving natural resources, and promoting dietary shifts toward more sustainable consumption patterns. This alignment with ecological responsibility underscored the principles of Food Serenity, which advocate for mindful, sustainable, and culturally rooted culinary practices (Wiseman et al., 2018).

The interdisciplinary approach also ensured that the final product transcended its individual components, emerging as a holistic experience. The design of the ceramic plate, crafted to complement the dish, reflected the fluidity and adaptability of sustainable systems. Together with the innovative culinary creation, it formed a cohesive narrative that invited diners to engage with the broader themes of sustainability, cultural heritage, and technological progress. This synergy between design and culinary science emphasized the importance of collaboration in achieving transformative results.

Involving chefs in the project added another layer of complexity and depth. Their understanding of flavor profiles, textures, and cultural significance brought authenticity and nuance to the dish, grounding it in the culinary traditions of Northeast Mexico. This connection to local culture was reinforced through the use of regional ingredients, which not only celebrated the area’s biodiversity but also supported local agricultural practices. The chefs' insights ensured that the dish resonated with diners on an emotional level, creating a sense of place and identity that enhanced the overall dining experience.

Beyond the immediate stakeholders, the project also highlighted the importance of involving broader networks, including material scientists, sustainability experts, and technologists. The high-temperature ceramic processes used to create the plate were optimized to reduce waste and energy consumption, demonstrating how advanced technologies can complement sustainable practices. Meanwhile, the incorporation of symbolic elements, such as the engraved celestial map and molecular motifs, required input from disciplines like astronomy and chemistry, showcasing the breadth of collaboration needed to realize the project’s vision.

By expanding the scope of collaboration, The Future is Fluid demonstrated the potential of multidisciplinary approaches to tackle complex challenges. This model of teamwork reflects a growing trend in the food and design industries, where diverse expertise is increasingly recognized

as essential for innovation. It also serves as a call to action for future projects to embrace similar strategies, breaking down silos between disciplines and fostering environments where creativity and science can thrive together.

The success of The Future is Fluid offers valuable lessons for industries seeking to address global challenges such as food security, environmental sustainability, and cultural preservation. Collaboration beyond design is not just an option but a necessity in a world that demands holistic solutions to interconnected problems. By bringing together chefs, designers, scientists, and technologists, this project set a precedent for how efforts can lead to meaningful, impactful innovations that inspire change at both individual and systemic levels.

8. Redefining the role of designers: Multidisciplinary collaboration and its broader impact on food systems

The Future is Fluid project illustrates the profound impact that multidisciplinary collaboration can have on food design, demonstrating the ways in which diverse expertise can shape innovative and meaningful culinary experiences. The integration of knowledge from design, science, sustainability, and cultural storytelling highlights how food design can become a powerful tool for addressing complex global challenges, such as ecological sustainability and the preservation of cultural heritage.

At its core, the project emphasizes the importance of holistic design practices. By merging elements of artistic design with scientific innovation and sustainability, the project exemplifies how design can influence broader food systems. This approach, which incorporates principles like Food Serenity, sustainability, and cultural narratives, is foundational in shaping a more responsible and forward-thinking food landscape. It shows how design can move beyond mere aesthetics to influence cultural and ecological consciousness, driving future possibilities in food systems.

Furthermore, the role of designers is expanding in this rapidly evolving field. In the past, design was primarily concerned with the visual and functional aspects of food-related products. However, as the challenges facing contemporary food systems become more complex, designers are now positioned as key players in facilitating interdisciplinary collaboration. Designers are increasingly becoming mediators—bridging gaps between scientific research, cultural storytelling, and consumer needs. This expanded role involves not only an understanding of form and function but also a strategic consideration of systems and long-term impact.

Designers now find themselves working in partnership with experts from fields such as food science, agriculture, sustainability, and technology, understanding that the future of food design is dependent on interconnected approaches. The Future is Fluid project serves as an exemplary case study of how designers can leverage their creativity and problem-solving skills to lead initiatives that address global issues such as sustainability, food security, and environmental impact.

This shift in the role of designers has significant implications. It positions them not only as creators of beautiful, functional products but as architects of systems that shape the future of food. This expanded responsibility requires designers to hone skills that go beyond traditional design knowledge, such as systems thinking, cross-disciplinary collaboration, and a deep commitment to creating sustainable, ethical solutions. By adopting this expanded perspective, designers can lead the charge in rethinking food systems in a way that values both human and environmental well-being, paving the way for transformative change in the culinary world.

In summary, the Future is Fluid case study showcases how multidisciplinary collaboration, and the expanded role of designers can reshape food systems. The project exemplifies the importance of integrating design with science, sustainability, and cultural awareness to create meaningful, long-lasting impact. The evolving role of designers as mediators and system thinkers will be crucial in addressing the complex challenges that lie ahead, making them indispensable players in the transformation of the food industry.

9. Embedding sustainability in food design: Practices, impacts, and future directions

Sustainability served as the cornerstone of The Future is Fluid, a project that explores how scientific, artistic, and design practices can converge to create innovative and immersive food experiences. By emphasizing the origins of food, promoting the use of local ingredients, and implementing sustainable practices, the project highlights the profound potential of food design to influence broader ecological and cultural contexts. Through its multidisciplinary approach, the initiative not only addresses current challenges in food systems but also teases future possibilities, demonstrating how design-driven innovation can contribute to a more sustainable and inclusive food industry.

A guiding principle throughout the project was the deliberate alignment of design and production processes with ecological awareness and sustainable practices. Every aspect of the ceramic vessel's development—ranging from material selection to manufacturing techniques—was chosen to minimize environmental impact. The use of abundant and naturally occurring elements, such as silicon and aluminum, exemplified this commitment, showcasing how these materials can provide both durability and low ecological footprint. Additionally, the beetroot-based glaze, developed through meticulous experimentation, served as a powerful symbol of the synergy between sustainability and aesthetic quality, proving that ecological responsibility need not come at the expense of functionality or beauty. User-centered approaches ensure that sustainability is seamlessly integrated into the design process (Norman, 2013).

Beyond the materials, the project integrated sustainability into its production methods and lifecycle considerations. The ceramic plate's creation relied on high-temperature processes that were carefully optimized to reduce energy consumption and minimize waste. These technical advancements highlight the potential for innovation within traditional craft, demonstrating how ancient techniques can be adapted to meet contemporary environmental standards. Moreover, the

collaboration with Forma Foods emphasized the use of plant-based proteins derived from ingredients like peas and beetroot. This focus aligns with global efforts to mitigate the environmental footprint of food production, particularly by reducing reliance on resource-intensive animal-based proteins.

The project also emphasized the role of design in fostering ecological and cultural awareness. By prioritizing local materials and drawing from the rich heritage of Northeast Mexico, the vessel serves as a narrative that connects diners to the land and its stories (Lando & Labiner-Wolfe, 2007). This approach reinforces the principles of "design for territories," where sustainability extends beyond environmental considerations to include cultural preservation and community engagement (Lee, 2009). The integration of sustainability into food design extends to every stage of the process, from ingredient sourcing to packaging. For instance, reducing the greenhouse gas emissions of food production is a critical component of sustainable innovation (Sonesson et al., 2010). Moreover, designing sustainable packaging, such as edible coatings, enhances ecological responsibility without compromising functionality (Verma et al., 2024).

Looking to the future, The Future is Fluid underscores the transformative potential of collaboration in driving sustainable innovation. By merging insights from science, design, and art, the project demonstrates how holistic approaches can address complex challenges within the food system. The vessel's design—grounded in material science, ecological principles, and cultural storytelling—becomes a blueprint for how sustainability can be embedded into every stage of the food design process.

Ultimately, this initiative serves as a powerful reminder of the interconnectedness of food, culture, and the environment. By balancing aesthetic excellence with ecological responsibility, The Future is Fluid presents a vision of what food design can achieve when sustainability is at its core. It not only minimizes environmental impact but also deepens our relationship with food, inspiring diners to appreciate the stories, people, and landscapes behind each meal. Through its thoughtful integration of sustainable practices and future-oriented design, the project establishes a new benchmark for innovation in the food sector, offering a model for how the industry can evolve in harmony with the planet and its people.

10. Conclusion

The Future is Fluid project exemplifies the power of design when intertwined with scientific innovation and cultural storytelling, driving meaningful change in food systems. By blending fields such as material science, gastronomy, and sustainability, it showcases how collaboration can foster both aesthetic and functional innovation while promoting ecological awareness and cultural preservation.

Central to the initiative is the principle of Food Serenity, which advocates for mindful consumption and a deeper connection to the origins of our food. Through the creation of a unique ceramic vessel and a plant-based dish, the project illustrates how design can transcend its utilitarian role, becoming

a narrative medium that connects diners to the cultural and ecological landscapes of Northeast Mexico while pushing the boundaries of sustainable food practices.

Furthermore, Future is Fluid redefines the role of designers as key drivers of innovation. No longer confined to aesthetics alone, designers are becoming facilitators of cross-disciplinary collaboration, enabling the fusion of tradition and technology. This evolution positions designers at the forefront of global challenges, addressing issues like food security, sustainability, and cultural resilience.

The vessel, crafted with deliberate symbolic meaning, further emphasizes this narrative. It serves not only as a functional object but as a symbol of harmony between cultural heritage, technology, and ecological awareness. The gold accents, reflecting both the technological and the transcendental, juxtapose with the earthy tones that reference the natural origins of plant-based proteins, creating a visual and conceptual bridge between tradition and innovation. As a whole, the vessel invites reflection on the origins of the meal, transforming the dining experience into an opportunity for connection, reflection, and understanding of the complex relationship between food, culture, and design.

Looking to the future, the Future is Fluid project sets a compelling example of how food design can inspire broader societal transformation. It calls on those in the culinary, scientific, and design communities to approach food not just as nourishment, but as a catalyst for connection, education, and sustainability. In the face of pressing environmental and social challenges, projects like this offer a promising path toward a more inclusive and sustainable future (Manzini, 2014).

In conclusion, by integrating sustainability, cultural heritage, and technological advancement, Future is Fluid reimagines the role of design in food systems. It challenges us to rethink our food choices, inspiring not just diners, but creators and innovators to envision a future where food transcends necessity to become a profound expression of human creativity and responsibility.

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The Sustainability Shift: Reimagining Food Art in the Age of Environmental Consciousness

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ABSTRACT | This study examines the far-reaching influence of environmental awareness on food art, contending that sustainability is reconfiguring culinary beauty not only as a moral responsibility but also as an inspiration to creativity. Traditionally defined by excess—from Baroque sugar work to the transitory "unicorn foods" of Instagram popularity—food art is being reimagined through practices prioritizing ecological balance. By examining visionary works such as zero-waste restaurant Silo, upcycled pop-up restaurant WastED, and Chloé Rutzerveld's Edible Growth through case studies, the research illustrates how these cases inspire innovation, combining ingenuity with breakthrough form. Technological innovations such as 3D-printed food and lab-grown meat also testify to how digital media and biotechnology redefine material possibility. The study envisions an interdisciplinary future and encourages food professionals, scientists, and policymakers to work together with the aim of building areas such as biodegradable materials and circular systems. By positioning food art as a tool for ecological stewardship, the project challenges the discipline to look beyond beauty and think about its role in planetary resilience.

KEYWORDS | FOOD ART, SUSTAINABILITY, CULINARY AESTHETICS, ZERO-WASTE RESTAURANT, FOOD AESTHETICS

1. Introduction

Food art is a human practice that unites gastronomy with visual art and design; it has fascinated audiences through its two expressive forms: culinary presentations and installations using food as a medium. In the field of haute cuisine, chefs such as Ferran Adrià (Wikipedia contributors, 2024) and Massimo Bottura (Wikipedia contributors, 2025) have elevated plating to an art form, crafting dishes that evoke narrative, emotion, and cultural critique through meticulous arrangement. Besides the art of plating, food art performers like Jennifer Rubell transform food into immersive art experiences, as noticed in her "Creation," 1,000 pounds of ribs on a white pedestal with honey dripping from the ceiling, a kind of buffet-themed performance piece that served as the opening night event for the Performa biennial in New York in 2009 (see Figure 1), tapped into the general hedonism that defines much of the art world (Miller, 2019). However, in the face of undeniable environmental destruction by the global food system, 26% of all global greenhouse gas emissions are attributed to food production, processing, and distribution (Poore & Nemecek, 2018), so it makes the once-celebrated excesses of food art are being reexamined.

Figure 1. Scene from Jennifer Rubell's "Creation (2009)," 1,000 pounds of ribs from Daisy May's BBQ with honey dripping from ceiling installation, Credit by Jennifer Rubell.

Historically, this field of food art prioritized spectacle over sustainability. From Baroque-era sugar sculptures (Keyser, 2014) that glorified colonial trade to Victorian gelatin molds dyed with toxic pigments (Colebrooke & Miele, 2017), food art has often relied on resource-intensive practices. Even today, social media platforms prioritize visually appealing content, leading to a culture where aesthetics dominate food choices, often at the

expense of sustainability (Irimiás & Volo, 2022), such as gold-leaf desserts or rainbow-colored "unicorn" foods, they perpetuate a culture of disposability, where aesthetics eclipse ecological ethics, for fleeting social media moments rather than nutritional value (Pellegrino & Shannon, 2021). Along with the awareness of climate change, food waste (1.3 billion tons annually) (World Wildlife Fund, n.d.) and supply chain inequities are driving a paradigm shift. An increasing number of chefs, artists, and technologists are redefining food creativity through sustainability, treating environmental responsibility not as a limitation but as a catalyst for innovation.

This paper focuses on the discussion of environmental issues in the contemporary food art, however it can't avoid the essence of food. Although the healthiness and taste of food are extremely important throughout the entire "life cycle," due to the complex origins of these factors and the subjective nature of evaluation data, they are not discussed in detail in this paper. Therefore, the issue this article concentrates on is the profound transformation that contemporary food art is undergoing, which involves merging aesthetic ambitions with food stewardship. One that merges aesthetic ambition with food stewardship, as Douglas McMaster exemplifies this shift, whose zero-waste restaurant Silo in London reimagines haute cuisine through circular systems. He frames sustainability itself as an artistic statement by eliminating packaging, composting all organic waste, and crafting menus from hyper-local ingredients. Similarly, Chloé Rutzerveld's 3D-printed edible ecosystems challenge the notion that sustainability compromises creativity. Instead, they prove that constraints —— whether ethical, material, or ecological —— can inspire new forms of beauty.

Through historical analysis and case studies, this paper positions sustainability as a necessary evolution for food art, not as a fleeting trend. We interrogate how the field can reconcile its legacy of indulgence with the urgent demands of environmental consciousness, proposing that the future of food art lies in its ability to balance visual aesthetics with ethical accountability.

2. Historical Context of Food Art

The history of food art reflects a paradoxical journey - oscillating between grandiose waste and mindful restraint. This duality is evident in how food has been represented in art, serving both as a medium for excess and a commentary on sustainability and social issues.

In Renaissance Europe, banquets became theatrical displays of power (Albala, 2007). For example, specially designed trenchers required diners to engage in performative acts, enhancing the theatricality of the event (Yeoman, 2017). This physical manipulation of these trenchers contributed to a culture of sociability, where guests participated in a shared experience that reinforced their social status (Yeoman, 2017). Nobles hosted feasts featuring gilded peacocks, sugar-crafted sculpture (Belozerskaya, 2005), and wines flowing into ornamental fountains (Krohn, 2016; Scully, 2011). These events focused on opulence over nourishment. Leftover food was discarded or donated to servants, reflecting a disconnection between artistry and sustainability. And the Victorian-era phenomenon of "dessert architecture," characterized by elaborate sugar sculptures, served as a luxury status symbol while obscuring their ties to colonial exploitation and enslaved labor (Keyser, 2014). The dessert architecture has visually stunning edible structures (Tarantino & Terziani, 2010), such as spun-sugar swans (Mason, 2002) and marzipan palaces (Borsato, 2023). They were designed to dazzle guests before being discarded, symbolizing a culture of conflated artistry with disposability.

The parallel food traditions embraced nature. In Japan, the kaiseki culinary tradition, deeply influenced by Zen Buddhist principles, its seasonal ingredients epitomized minimal-waste artistry through its preparation and presentation. This tradition emphasizes aesthetic beauty and aligns with Buddhist values of mindfulness and respect for nature, resulting in a cuisine that minimizes waste and maximizes flavor and visual appeal. Guided by shun (seasonality), Kaiseki chefs transformed local, ephemeral ingredients, such as wild mushrooms in autumn and bamboo shoots in spring, into multi-course meals where every stem, leaf, and broth carried intentionality. It reflects a broader Buddhist ethos of sustainability and mindfulness, encouraging a deep appreciation for nature and the environment (Payne, 2024). Kaiseki is about taste and visual appeal, where the arrangement of food reflects seasonal themes and cultural significance (Andoh, 2005). This artistic presentation enhances the dining experience, making it a feast for the palate and the eyes ("Washoku, Japanese Food," 2022).

Indigenous cultures, too, practiced sustainable food art, the Māori hāngī feast cooked root vegetables and meats in earth ovens (Borolla et al., 2024), rooted in cultural values that emphasize respect for the environment, fostering community resilience and biodiversity conservation (Adefila et al., 2024; Rathoure, 2024), honoring the land through cyclical use of natural materials.

The digital age, however, reignited food art's fraught relationship with excess. Social media platforms democratized culinary creativity but prioritized visual shock over substance. The #foodporn hashtag, with nearly 10 million posts showcasing visually appealing food (Mejova et al., 2021), reflects a cultural obsession with food aesthetics, the presentation overshadows nutritional value, leading to a potential normalization of excess consumption (Mcdonnell, 2016). Viral trends, including rainbow bagels and glitter —— coated coffees, fueled a demand for hyper —— aesthetic products designed for screens rather than sustenance. The emotional and visually engaging narratives associated with these products enhance their shareability, further fueling their popularity (Koçyiğit, 2018). This "disposable aesthetics" reflected a new form of indulgence: one where food art served algorithms rather than communities, and sustainability became an afterthought.

This brief demonstrates a complex shift from opulent waste to conscious restraint, reflecting deep contradictions in cultural values and social structures. Particularly in modern times, facing global environmental challenges and resource scarcity, the practice of food art is increasingly emphasizing sustainability and respect for the environment. However, the digital age's social media has driven the popularity of visually-centered food art, a trend that, while increasing the accessibility of food art, may also lead to resource overconsumption and waste. Currently, we must reconsider the direction of food art to ensure that it not only enhances visual appeal but also places a greater emphasis on long-term food sustainability. In this way, food art can become a force in pushing society towards more sustainable consumption patterns.

3. Critiques of Traditional Food Art

The above traditional food art, celebrated by its creativity and cultural resonance, faces mounting criticism for its environmental and ethical contradictions. As the climate crisis intensifies, practices once lauded as artistic achievements are now scrutinized for their ecological footprints and social inequities.

Since 2014, the number of people affected by hunger has been slowly on the rise, and tons

and tons of edible food are lost and/or wasted every day. Around 13.2 percent of food produced is lost between harvest and retail, while an estimated 19 percent of total global food production is wasted in households, food service, and retail (United Nations, n.d.). The carbon footprint of resource —— heavy ingredients exacerbates this toll. Black truffles require approximately 1,000 liters of water per kilogram for cultivation (Büntgen et al., 2019), and their transport via airfreight results in 12.5 kg of CO^2 emissions per kilogram, contributing to the overall carbon footprint of this luxury food item (Liu et al., 2015). In addition, transporting out-of-season ingredients contributes to greenhouse gas emissions (Qin & Horvath, 2021) , such as tropical fruits in Nordic tasting menus or imported caviar in Japanese kaiseki imitations undermine regional sustainability.

Beyond environmental harm, traditional food art often relies on ethically fraught practices. The globalization of culinary aesthetics has normalized ingredients sourced from ecologically vulnerable regions, such as vanilla from deforested Madagascan farms or bluefin tuna from overfished Pacific stocks. In Madagascar, around 70,000 farmers produce the majority of the world's vanilla, yet many face socio-economic challenges (Hänke et al., 2018). Overfishing of bluefin tuna has led to drastic population declines; they are at risk of collapse due to unsustainable fishing practices (Jeswani & Azapagic, 2019). These supply chains impact low-income communities, which bear the brunt of environmental degradation, while elites enjoy the artistic end products. Such practices "aestheticize extraction," turning systemic inequities into curated experiences.

In contemporary art, material selections in food art installations also provoke anger. Many contemporary artworks use non-biodegradable materials (resin, styrofoam, plastic polymers) to preserve perishable ingredients, as seen in Kara Walker's installation "A Subtlety" (2014), which mixed sugar, polystyrene, plastic, and molasses. While intended to critique consumerism, such works ironically replicate the wastefulness they aim to condemn. Food art's ephemerality considers its inevitable decay, which mirrors human mortality, a theme explored in works like "The Dinner Party" by Judy Chicago (Broude, 2018, Chapter Judy Chicago's Dinner Party). However, the urgency of climate change calls for a shift from thoughtlessness to responsible action, where artists and society must reflect on their impact on the environment (Raepple, 2019).

4. Case Studies in Sustainable Food Art

The following case studies exemplify how chefs, designers, and artists are redefining food art through sustainability.

4.1. Silo (London)

Douglas McMaster's Silo Restaurant opened in 2014. It is the world's first zero-waste restaurant, and its new paradigm introduces sustainability, culinary innovation, and visual beauty. Silo is founded on the "closed-loop" principles of sustainability, where all aspects of its supply chain are designed to reduce waste (see Figure 2). As its website comments: "Zero Waste is just a system with no loose ends (*Douglas McMaster*, n.d.)." At Silo, 85-90% of the original materials of food that come in are very effectively processed into things that end up in the customer's and staff's bellies rather than those are around 50% in most restaurants. The last 10-15% is more challenging, and 5% is recycled (Chessé, 2022). Silo sources a majority of its produce from local farms, working with small-scale farmers. This ranges from "ugly" fruit and vegetables rejected by supermarkets (knobbly celeriac, knotted Jerusalem artichokes, and bruised apples), that McMaster turns into meals such

as koji-fermented vegetable steaks matured in-house for six months. Spent grains from nearby breweries, typically wasted as waste, are turned into sourdough bread via a 72-hour fermentation process[1].

Figure 2. The way of Silo is to use absolutely every gram of each ingredient that enters its kitchen, using processes such as fermentation, pickling, and preserving to ensure nothing is thrown away. Anything that can't be reused is composted except the food itself, Credit by Silo Restaurant.

McMaster's strategy reminds us of the Japanese philosophy of mottainai (a feeling of remorse for waste), where imperfection is a visual and ethical statement. The building itself reflects its principles. Everything at Silo is recycled or recyclable, even the furniture – the tables and the counter are made of recycled plastic packaging, the lights out of wine bottles, and there is an aerobic digester, which is capable of turning 60kg of organic waste into compost, overnight (De Gamme, 2021), which is fed back to partner farms. At the same time, these materials either biodegrade or easily disassemble for repurposing in the future (*Silo, the World's First Zero-waste Restaurant by Award-winning Chef Douglas McMaster, Designed by Nina+Co.*, 2020). Silo's furniture redesigns rejected natural materials for a serviceable, sustainable design. The host stand is made of offcuts and other unusable timber parts laminated together and sculpted to the likeness of a tree stump. Above it hangs a pendant light ingeniously molded from foraged seaweed. The floor is made of natural cork, hand —— harvested without harming the tree from cork oak bark; this carbon-negative product points out that regenerative materials are key, with the cork oak forests absorbing five times more CO^2 than is emitted from manufacturing. The front of the bar is clad in recycled leather, while the dining counter is made from waste polyester packaging that has been reworked through an exhaustive hand-manufacturing process into a smooth, refined surface. Even the 12-meter-long bartop is designed by Smile Plastics using recycled materials and can be recycled ad infinitum to create a circular lifecycle (*Silo, the World's First Zero-waste Restaurant by Award-winning Chef Douglas McMaster, Designed by Nina+Co.*, 2020). No single piece of furniture in Silo is just a piece of furniture; rather, it has a story of innovation, sustainability, and the beauty of waste being repurposed.

[1] This restaurant is priced on the higher end and has some negative reviews regarding its cost. There are not many comments about its taste. In writing about this restaurant, I primarily referenced various online sources. The article attempted to incorporate the views of culinary critics; however, given the ambiguous definition of "food critic," this effort did not achieve the expected results. This also complicates the reliance on more subjective information such as "taste of the food" and "public reviews," which can impact the main arguments of the article.

McMaster even combined his personal experience with practical advice and wrote a book called "Silo: The Zero Waste Blueprint," which offers a comprehensive guide to revolutionizing the way we think about food, waste, and sustainability (McMaster, 2019). It explores Silo's philosophy, emphasizes its closed-loop systems, and the importance of rethinking how we source, prepare, and dispose of food. McMaster considers that if we can see what waste is and how it got there, we have the understanding to design it out of our world (*Douglas McMaster*, n.d.). Silo's procurement policies of "ugly food[2]" (see Figure 3) also stimulated the EU to recognize the importance of integrating sustainability into food quality policies, EU proposed a roadmap for enhancing food supply chains, emphasizing the need for cohesive procurement policies that include ugly produce (Mattas et al., 2021).

Figure 3. Samples of "ugly food" and their fate, Credit by www.usesilo.com.

4.2. WastED (NYC)

Dan Barber's WastED pop-up, launched in New York City in 2015, aimed to show the dining world how much can be done with scraps (see Figure 4), leftovers, and industrial byproducts by transforming them into gourmet experiences (Roth, 2015). Hosted in a Greenwich Village space adjacent to a dumpster, the project served over 5,000 meals crafted from ingredients typically deemed waste, such as juice pulp, fish bones, and overripe fruit. The menu included such as kale rib stew, pasta trimmings, and dog food with a glossary that doubled as education on all the perfectly edible food we don't eat—from broken razor clams to immature eggs (*Let's Get Wasted!*, 2023). Meals were served on upcycled cardboard plates alongside "dumpster wine," a blend of unfinished bottles from local restaurants, forcing diners to confront the arbitrariness of food aesthetics and the value of discarded materials. During the first WastED pop-up, the restaurant served 10,000 dishes, and it saved 600 pounds of "ugly" vegetables, 150 pounds of kale ribs, 30 gallons of beef tallow, 475 pounds of skate cartilage, 350 pounds of vegetable pulp, and 900 pounds of waste-fed pigs (January, n.d.).

[2] "Ugly food" refers to edible fruits, vegetables, and other food items that are deemed imperfect or unattractive because of their unusual shapes, irregular sizes, discoloration, or minor surface blemishes. But it is no less valuable than its "perfect" counterparts. By promoting awareness, changing market and consumer behavior, and finding innovative ways to use imperfect food, we can reduce food waste, conserve resources, and create a more sustainable and inclusive food system.

Figure 4. Wasted revisited during the WastED, Credit by Clerkenwell Boy and WastED.

The creative menu of WastED includes:

- Veggie Pulp Burgers: A blend of carrot, beet, and kale pulp from juice bars (30% of NYC's food waste), bound with spent barley from Brooklyn's Sixpoint Brewery.
- Fish Bone Soup: This soup is simmered for 12 hours using salmon spines discarded by seafood wholesalers and vegetable trimmings from Michelin-starred kitchens like Eleven Madison Park.
- Dessert "Waste": Chocolate-covered strawberry tops and ice cream from overripe bananas sourced from Union Square Greenmarket vendors.

The transient nature of this project underscored the systemic challenges of food waste; nearly 60 million tons (120 billion pounds) of food are wasted each year in the US, which accounts for almost 40 percent of the entire US food supply. The majority of this discarded food ends up in landfills, occupying 22% of municipal solid waste, with the wasted food valued at approximately $218 billion, equivalent to 130 billion meals (RTS - Recycle Track Systems, 2025). Barber used WastED to advocate for systemic shifts in consumer and retailer perceptions of "ugly" or surplus food, emphasizing the need for circular supply chains and policies that reduce waste. While critics argue such initiatives address symptoms rather than the root causes of overproduction, WastED's enduring legacy lies in its inversion of value—using creativity to transform waste into something meaningful, as he proposed: "The future belongs to people who care about food (Bonneau, 2016)." His book The Third Plate (2014) has made him a leading spokesperson for sustainable food (Barber, 2014).

4.3. Chloé Rutzerveld's "Edible Growth"

Eindhoven-based designer Chloé Rutzerveld's Edible Growth (2014) (see Figure 5) merges 3D printing, biotechnology, and gastronomy to envision a sustainable food future and discuss the potential use of 3D printing (also known as additive manufacturing) in food production (*Chloé Rutzerveld Food Design*, n.d.). Edible Growth fully natural, healthy, and sustainable food made possible by combining natural growth, technology, and design (Escalante-Aburto et al., 2021). With the rise of more high-tech food and new production methods, consumers are becoming increasingly more concerned about the quality and "realness" of the food and their health, this project features 3D-printed edible structures made from pea protein, seeds, and mycelium. It uses a modified 3D printer to extrude edible "soil" from pea protein, agar, and seeds (e.g., basil, mustard) into porous, geometric structures. Mycelium (Rhizopus oligosporus, refers to the network of thread-like structures, called hyphae, that make up the vegetative part of a fungus.) spores are injected into the matrix, which colonizes the structure over five days, digesting the substrate and sprouting

microgreens. Over five days, the seeds sprout, and mycelium colonizes the shell, creating a living snack that evolves in form and flavor. This "food as process" approach eliminates packaging waste, reduces transportation emissions through hyper-local production, and invites diners to engage with food's lifecycle as an artistic experience. It exemplifies how biotechnology can disrupt traditional food art, prioritizing ecological harmony over fleeting visual spectacle.

Figure 5. The Edible Growth, Credit by Chloé Rutzerveld.

Rutzerveld considers himself a food printing skeptic. She challenged herself to find a way to use the technology of 3D printing to create healthy food while shortening the food production chain in the process (*Chloé Rutzerveld Food Design*, n.d.). Although Edible Growth is future food, Rutzerveld's work exemplifies critical design, using provocation to challenge norms. Food art shouldn't just feed bodies but also feed thoughts.

Rutzerveld, by challenging traditional methods of food production, not only explores how technology can assist in providing healthier food solutions but also emphasizes the thought-provoking nature of food art. This perspective suggests that food art is not only about providing physical nutrition but also serves as a means to inspire visions and challenge conventional thinking. It reflects an ideal where art and technology collaboratively contribute to advancing society and culture toward deeper awareness and sustainability. Rutzerveld's work provides a commendable model, demonstrating how the integration of technology and art can propel the food industry toward greater sustainability.

4.4. Other Restaurants

Meanwhile, restaurants worldwide are taking matters into their own hands, going zero-waste and implementing sustainable practices, hence making a path toward eco-friendly dining. Helsinki-based restaurant Nolla doesn't have a trash bin; instead, it sources its ingredients without single-use packaging and composts waste on-site. Two-Michelin-starred Roganic in London brings in a farm-to-table approach by partnering with small-scale, sustainable farms and creatively reusing ingredients, such as vegetable trimmings, to reduce waste. The Sustainability Pavilion Restaurant at Expo 2020 Dubai has pledged to zero food waste by introducing innovative cooking methods that turn leftovers into compost or animal feed. In Copenhagen, Amass combines fine dining with zero waste principles: fermenting, pickling, and preserving its ingredients, using food waste to compost for its urban garden. In Sydney, Australia, Olio is based on a full-cycle

philosophy-composting organic waste, donating surplus food, and highlighting local seasonal ingredients. London's Berber & Q concentrates on nose-to-tail cookery whereby every part of the animal, including bones and trimmings, is used to make stocks.

These cases demonstrate that sustainability is not a limitation but a catalyst for redefining food art. Whether through Silo's closed-loop systems, WastED's waste-to-luxury alchemy, Rutzerveld's living snacks, or even the spreading global sustainability trend, each project challenges the historical equation of artistry with excess, implies that these projects are redefining the relationship between creativity and resource use. They show that creativity, innovation, and high-quality outcomes can emerge from sustainable practices, efficient use of resources, and even from what is traditionally considered "waste." The common thread is clear: ecological constraints inspire innovation, proving that the future of food art lies in its ability to harmonize beauty with planetary resilience[3].

5. Technological Innovations

Integrating advanced technologies into food art has opened new frontiers for sustainability, enabling creators to reimagine aesthetics, ethics, and resource efficiency. We will analyze three transformative innovations: 3D printing, lab-grown foods, and digital surplus platforms.

5.1. 3D Printing: Precision and Nutrient-Dense Design

3D food printing (3DFP) has emerged as a tool for radical resource efficiency, allowing artists to craft intricate edible structures with minimal waste, such as Fused Deposition Modeling (FDM) and Liquid Rope Coiling (LRC), to create complex food structures with controlled properties (Millán & De La Torre, 2024). Contrasting with traditional subtractive manufacturing methods, the additive nature of 3D printing minimizes excess material usage (Nyika & Dinka, 2024), aligning with sustainable manufacturing practices, embed functional nutrients into aesthetically daring forms.

According to Ghorbani et al. (2024), LRC allows for the creation of coiled food structures with adjustable porosity and fracture properties, enhancing textural experiences. Many chefs and gastronomy experts utilize 3DFP to create visually appealing and nutritious meals, contributing to the evolution of modern cuisine (Elshaer et al., 2024), and it is particularly beneficial in developing foods for special medical purposes, catering to unique dietary needs and enhancing sensory experiences (Shi et al., 2024).

However, while 3DFP enables hyper-local production (e.g., restaurants printing with on-site grown ingredients), its energy footprint remains a challenge. The high energy consumption raises concerns about its environmental footprint (Annibaldi & Rotilio, 2019). The market for 3D-printed foods also faces challenges related to regulatory frameworks and production costs (Shi et al., 2024).

[3] Planetary resilience refers to the Earth's ability to absorb disturbances, adapt to changes, and maintain stable environmental, ecological, and social systems that support life. It is a concept rooted in sustainability and ecosystem resilience and emphasizes safeguarding the planet's systems in the face of challenges like climate change, biodiversity loss, pollution, and resource depletion. It emphasizes the need to preserve ecosystems, address climate change, and manage resources sustainably. By fostering global cooperation and adopting innovative, sustainable practices, humanity can enhance the planet's resilience and live within its ecological limits.

5.2. Lab-Grown Foods: Cellular Agriculture as Ethical Canvas

Lab-grown foods - produced by culturing animal cells or plant tissues in bioreactors - offer a groundbreaking medium for ethical food art. By decoupling aesthetics from industrial animal farming, artists can interrogate concepts of life, consumption, and ecological harmony.

Bistro In Vitro, the world's first lab-grown meat restaurant, invited participants to explore the possibilities of cultured meat (*Welcome to Bistro in Vitro - Bistro in Vitro*, 2015). During the Creativity World Forum 2019 (CWF 2019), they showcased conceptual dishes like "synthetic steaks" and "lab-grown meatballs," emphasizing the potential to create protein-rich foods without slaughtering animals (*Chloé Rutzerveld Food Design*, n.d.). For example, participants could imagine redesigning traditional dishes into entirely new forms, such as "printed chicken wings" made from cultured cells, which retained the taste and texture of conventional meat while eliminating ethical and environmental concerns. By exploring and pushing the boundaries of food culture, they want to do away with the idea that cultured meat is an inferior meat substitute; they serve a digital selection of sustainable, animal-friendly, exciting, and delicious dishes that will prompt thought and discussion on in vitro meat (*Welcome to Bistro in Vitro - Bistro in Vitro*, 2015).

Companies like Mosa Meat and Aleph Farms now collaborate with chefs to design cultured meat dishes and reduce land use compared to traditional livestock. However, the energy-intensive bioreactor process, which requires more electricity than conventional butchery, and cultural resistance to "Frankenfoods (a term used to describe genetically modified or lab-created foods that combine "Frankenstein" and "food")" pose barriers (Martins et al., 2023). Some consider the Lab-grown art must confront the creepiness factor to achieve mainstream resonance, they consider artificial meat or synthetic food somewhat strange

5.3. Digital Tools: Rescuing Surplus Through Data

Mobile apps such as Too Good To Go and Olio leverage real-time data to rescue surplus food, transforming waste into opportunities for sustainability and community connection. They provide artistic and practical solutions for minimizing food waste, with curated "surprise bags" or local exchanges of surplus items (*Too Good to Go Marketplace App | How to Pick up a Surprise Bag*, n.d.). For example, Too Good To Go allows restaurants and cafes to sell surplus food at reduced prices. In November 2024, a user reported purchasing various "surprise bags" from local bakeries and restaurants. One bag from Lady Glaze Doughnuts contained 12 assorted gourmet donuts valued at $40, purchased for just $11.99. Similarly, a Markham Bakery & Cafe surprise bag included 10 assorted bakery items for $6.99, featuring pineapple buns, cheese buns, and egg tarts (Stenoodie, 2025). These curated bags reduce food waste and provide customers with affordable, high-quality meals, turning surplus into a curated artistic experience.

Moreover, Olio's broader mission extends to all household items, encouraging users to share, lend, or sell pre-loved goods (Ormesher, 2023). Its emphasis on community-driven action has led to significant environmental and social benefits, such as preventing millions of items from ending up in landfills. By fostering local connections and promoting sustainability, these digital tools demonstrate how technology can be harnessed to rescue surplus food and materials while building stronger communities.

In addition to the food app, at CWF 2019, this principle was applied creatively by recycling coffee grounds. All coffee grounds from the event were collected in a transparent cylinder

and later donated to ZuiderZwam (a local food company), a local oyster mushroom farm (*Chloé Rutzerveld Food Design*, n.d.). These grounds became a substrate for mushroom cultivation, illustrating how even "waste" can be transformed into valuable resources.

These innovations of resource transformation underscore a dual role of technology in sustainable food art: a catalyst for precision and ethical reimagining, yet constrained by energy costs, accessibility, and cultural biases. While 3D printing and lab-grown foods offer visionary alternatives, their scalability depends on renewable energy integration and public education. Similarly, digital platforms democratize waste reduction but risk-reducing systemic change to individual acts. For food art to truly align with planetary health, technological advances must be paired with policy shifts and grassroots advocacy.

6. Discussion and Conclusion

The rise of sustainable food art has ignited profound debates about the relationship between aesthetics, ethics, and economics. The ecological constraints foster creativity—exemplified by Douglas McMaster's Silo, where ingredient limitations inspired fermented celeriac steaks and brewery grain sourdough. Similarly, Dan Barber's WastED transformed pulp and fish bones into dishes that redefined luxury through scarcity. However, when every plate must tick an ethical box, we risk losing the anarchic spirit of food as art. This sustainability risks homogenizing artistic expression. This tension is not a binary but a dialectic: sustainability challenges creators to reimagine beauty through symbiosis rather than excess.

There is a growing appetite for eco-conscious artistry, and consumers increasingly prioritize sustainability, with zero-waste practices resonating strongly with their values (Berrones-Flemmig et al., 2022). These zero-waste dining experiences show that restaurants adopting zero-waste practices can enhance the restaurants' appeal and competitiveness (Zaman, 2022). The development of zero-waste systems, such as anaerobic digestion for food waste, can significantly improve waste management efficiency and sustainability. However, a paradox persists: many people claim that they would pay for sustainable meals, but they do not for the reason that the perceived high cost of sustainable food options discourages many consumers from following through on their intentions (Muñoz-Martínez et al., 2024; Köse, 2024). This gap underscores the economic realities facing sustainable food art. Silo's expensive tasting menu and lab-grown meat's prohibitive production costs reflect systemic inequities in green technology access. However, solutions are emerging: crowdfunded initiatives like WastED's community feasts and Barcelona's Espigoladors (a nonprofit turning "ugly" produce into affordable art jams) demonstrating scalable models for democratizing eco-art.

In order to match food art with environmental sustainability, three general directions need to be followed. First, there need to be policy incentives, where governments subsidize sustainable practices by offering grants and tax deductions, as the EU's Farm to Fork program does (*Farm to Fork Strategy*, n.d.), encouraging circular models of production in the food sector. Second, material innovation needs to be emphasized, speeding up the development of biodegradable materials. Lastly, cross-disciplinary discussion by policymakers, scientists, and chefs is required to create guidelines for ethical sourcing. Food art's future is not forsaking tradition but interpreting it in light of today's challenges. Just as Renaissance feasts once reflected the colonial extractivism of their time, sustainable practices today reflect a culture confronting climate collapse and attempting

to innovate.

Thus, a radical reimagining of the role of food art is essential: it should transition from being a reflection of human indulgence to a symbol of ecological stewardship. By fostering collaboration among chefs, artists, and scientists, we can transform dining experiences into powerful acts of environmental advocacy—each plate, policy, and microbial culture contributing to a broader revolution. This transformative approach not only addresses the immediate impacts of our food choices but also ensures a healthier planet and population for future generations, effectively intertwining food sustainability with broader ecological and public health objectives.

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THE UNIMAGINED POSSIBILITIES OF EATING: AI AND DISCURSIVE DESIGN IN CONSTRUCTING NEW MEANINGS

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ABSTRACT | This conceptual paper sheds light on the possibilities of discursive design and AI-assisted sketching in food-related innovations. Food — products, services, and events — is often conservative and rooted in tradition. The design methods presented here can bring new and radical perspectives to incremental product and service development in the field of food, and to eating as a cultural element.

A discursive and critical view offers opportunities for surprising possibilities that can be further applied in practice during the product development phase. It also allows for reflection on existing and potential challenges within food systems. The methods of discursive design help to break free from rigid realities and provoke perspectives on the futures of food while stimulating various stakeholders' engagement in taking responsibility.

Sketching food ideas is, based on our experiences, challenging for design students, let alone for developers without a design background. This difficulty creates barriers to free ideation. Using AI as a sketching tool enables visualization even for non-experts and encourages imaginative experimentation. The discursive approach combined with AI in food design allows for the presentation of unimagined ideas, concepts, and prototypes as a basis for discussions in product development. The article is based on the authors' experiences from a student project conducted for a food company.

KEYWORDS | FOOD DESIGN, DISCURSIVE DESIGN, AI-ASSISTED DESIGN, DESIGN EDUCATION

1. Introduction

This conceptual working paper presents a unique perspective on food design and design education: a discursive design approach combined with the use of generative artificial intelligence. This approach produces a new model for the challenging food design discipline.

Global problems of food systems – climate change, food security, hunger, obesity, etc. (Wise 2019, Patel 2008) – pose new challenges to the established practices of eating and the material nature of food products, which are reflected in how food products are designed. However, due to the conservatism, traditions and practices of the industry, developing – and visually communicating – new food concepts is demanding for those without a design background or just learning creative ideation. The testing task of a design teacher is to guide students towards undiscovered technologies and design assignments so that they can find solutions to unrecognized problems (Darling-Hammond, 2010). How can the combination of AI-assisted ideation and discursive design support the designing of unprecedented food concepts?

Using artificial intelligence as a sketching tool in food design removes obstacles enabling opportunities for wider participation and encouraging imaginative experimentation. The designer way of thinking (Cross 2023) together with a discursive approach offer the traditional food industry a basis of new perspectives for discussion and novel ideas closer to the consumers' experiences.

2. Food design

Food design can encompass design that concerns industrial food production and its products, local food, dining environments, cultural practices: everything related to nutrition. A designer should see food as a material object of design, just like any physical product. But how can design guide people to a broader understanding of future possibilities – also related to the areas of food and eating? Design scholars are beginning to recognize the potential of design, not only in producing products, services and strategies, but also in changing mindsets and behaviors, including the way we design, produce and consume food products.

This shift requires a different view of design practice. Borrowing from the framework of practical design, the first step in these processes is to broaden participants' understanding of future possibilities. In opening up future prospects, the designer identifies a broader spectrum of futures and, ideally, engages in dialogue with other people and their spectrum of possibilities. (Otto 2019.)

The analysis of food design trends and goals creates different outcomes, which are determined by background knowledge and expertise (Zampollo 2016), and no single food

design project should aim to address or resolve all aspects. Therefore, understanding one's own area of activity and abilities is also important when defining a food design project. Ogata and Mizuno (2023) found in their food design workshops that focusing on food and its social environment often led to thinking about food design and eating moments, while focusing on food imagery promoted thinking around food preparation and raw materials. This way of thinking was present also in our previous food design course; students who thought more about the appearance and appeal of food focused on the food's raw materials and actual feasibility, and students who thought about eating events mainly focused more on the ways in which food and its packaging are used.

2.1 Food design challenges

The potential of creative approaches is enormous, as they can produce new unexpected sustainable products, services and practices for food design, production and consumption. At the same time edible material as the basis for ideation and conceptualization is unusual, strange and difficult to approach for design students. Food design is partly influenced by the experience of food as a conservative area. Food is strongly associated with ideas of familiarity and safety, tradition and continuity. At the same time, while it is easy for top chefs to develop and experiment with new dishes and create trends, it is difficult for large manufacturers, despite their will, to participate in rapid and radical innovation, as the pace of change in the food industry is slow (Spence 2017).

The boundaries between food types seem difficult to break. However, the histories of foods and dishes can reveal surprising stories of development, albeit slow ones, and they have often happened under the influence of chance and circumstance. Perhaps this influences our ideas about the rapid renewal of food, making food an area where radical changes are scary and difficult to accept – and therefore also to imagine and visualize.

The impact of food beyond our own experiences is enormous, especially in terms of culture, environment and human justice. A deliberative design process that considers its consequences and impacts could open up challenges in understanding and experiencing food. The field of food design is vast and challenging to define, and it is inevitably interdisciplinary and multidisciplinary due to all the knowledge and skills it contains (Zampollo 2016).

Designers not only design food but also the ways it is produced, creating a good area to reflect on current problems, future values, and the social and political impacts of food systems. The combination of food and design widens our attention, and the role of design in future thinking is particularly compatible with solving broader challenges related to food. (Sweetapple & Warriner 2017; Flood & Rosenthal 2019.) Designers should primarily consider food design starting from the background and effects of food with the help of discursive design methods as tools for future thinking and a way of perceiving changes and possibilities in food-related topics. Within food design, design thinking's core principles along with empathy and understanding the users –benefiting also innovation (Castanho et al. 2024; Olsen 2015) – might be enhanced with the discursive method, which widens our views and reconsideration on the issues.

3. Discursive design

Discursive, and critical, design is an opportunity to spark discussion through design, by doing design. The material language of design is harnessed for intangible purposes where the object or concept interprets the culture – real or unreal – in which it might occur provoking reflection by speculating on the consequences of our behavior or suggesting changes (Dunne & Raby 2013; Tharp & Tharp 2018). The aim is to discuss the real desirability of things, what we should and not do. Morality and design can work together to change behavior and values, or to encourage a more thorough understanding of the short- and long-term effects. (Dunne & Raby 2013; Allen 2019.) Discursive design is a creative and emotional research method not dominated by reactive problem solving but by envisioning new possibilities and involving people in critical thinking asking more questions than it seeks to answer: the core are subjectivity, ambiguity and arousing ideas (Koskinen et al. 2011; Malpass 2017).

The method can be used to understand problems and discover new unnoticeable things – making things has its value, whether they are prototypes, scenarios or detailed concepts (Koskinen et al. 2011). Speculative design in all areas of society helps define factors that can influence the realization of more desirable and malleable futures (Dunne & Raby 2013). According to Dunne (2008), the most important element of discursive design is directing attention to alternative legal, cultural and social rules, and Allen (2019) believes the rhetorical means of design being one force that help improving different issues.

Discussion through design makes the issues more concrete and easier to approach. Ambiguity and contradiction appeal to emotions and act as reflections of reality making us consider whether what is presented is possible, our own role in it, and especially its desirability. While a discursive designer must be confident in effectiveness, responsibility about harmful consequences is important: which things and parties benefit from the work's discourse and which do not – intentionally or accidentally (Tharp & Tharp 2018).

3.1 Discursive design as a participatory method

Design for the people through the people could be one way to describe discursive design's subjective and goals in general, and it exists only through its perceivers. It also challenges the underlying habits of thinking and acting by questioning in general who does what, whose ideas matter and why.

Design practices that include more diverse partaking in both beyond and within design are needed. Engaging those most affected by the results is a way of ensuring relevance in research. This secures the designed products meeting all needs, and one goal of participatory design is bringing more democracy into design processes (Foth & Axup 2006; Crouch & Pearce 2016). “If people are authors of their experience they are doing and not just undergoing” (Dixon 2020, p.44). This also makes discursive design methods inherently participatory if we manage to see people not as users but as co-doers. The changing social, cultural and political areas also direct the discussion of what participation means and for whom, and design thinking methods with human-centered design can help with the question how we approach design (DiSalvo 2022; Gioia 2015).

Discursive and participatory design are able to offer novel forms of inquiry in combining the artistic and imaginative features of the former and the political aspects of the latter, and if an audience is to appreciate these kind of works of design, they too must work to understand: they are taking part in creating (DiSalvo 2022; Dixon 2020). The discursive approach cannot be seen only as a method seeking for the reactions of its audience but rather participating them in the presented issue. Taking part in action and directing the ways of seeing and using design are elemental in discursive design and participatory design approaches, but also in expanding the areas design – and people – can involve in.

4. AI-assisted sketching and ideation

Some design tasks can be automated with AI just as the early CAD softwares were created to make certain steps easier to perform for everyone (Tholander & Jonsson 2023). AI-supported sketching and ideation should also be seen as such; using time and knowledge on more efficient areas of design processes, faster presentation of detailed concepts while expanding inclusion. Just like reflecting sketches expands creativity and new concepts the use of AI can also lead to spotting new trends while helping faster testing of ideas (Holliman & Brisco 2024; Moreira da Silva 2023; Sreenivasan & Suresh 2024).

AI generated suggestions might support defining the design space, and adding "chance-based interaction" encourages reflection and unforeseen course changes while maintaining meaningful actions (Tholander & Jonsson 2023). The readjustment and selection should designate design processes supported with AI systems, and concentrating on creating series of alternative solutions before the final concept (Moreira da Silva 2023) should be as essential as in conventional sketching processes.

Fast generation of ideas and in-depth images with low requirements for drawing skills, identification of design problems, but also the involvement of less experienced people have been the identified benefits of AI in different design processes (Holliman & Brisco 2024; Tholander & Jonsson 2023). AI-powered images might enhance the clarity of the common language and the collaborative chances, like with conventional sketching where the peculiar process in conversion of thoughts into communicable ideas takes place, but it might also increase creative innovative exploration (Moreira da Silva 2023; Sreenivasan & Suresh 2024).

AI-assisted process as a co-design operation between humans and machines is a post-humanist view on design. More-than-human perspectives and this novel way of co-creation helps combining different potentials. (Tholander & Jonsson 2023.) The human-centric methodology of design thinking integrated with AI's explorative character provide possibilities for innovation, but it must be stressed that AI cannot replace the value of human emotion, empathy and ethical reflection (Sreenivasan & Suresh 2024).

Artificial intelligence will change the way we do design; designers will increasingly become curators of product and service ideation and definition, steering the course of AI-generated solution options in the desired direction. One might think that the role of designers in innovation is more focused on exploring alternatives and possibilities than on quick innovation process: more design, less production. At the same time, the traditional

principles of design are shifting from the idea of striving for the perfect product to learning systems that are good enough – for now.

Artificial intelligence can support a designer's divergent thinking by creating connections between things and generating unexpected and novel ideas among the design team. A non-typical idea generated by AI can inspire a designer to think outside the box, both in terms of function and form. This makes it easier to question people's ways of designing and avoid the Einstellung effect, where a designer abstains from new ways of solving problems due to their previous experience.

5. Add together: AI + discursive design + food design

In our experience, sketching food is a difficult task for design students as realistic visualization of food is hard and thus limiting the actual idea generation and confidence. Here, artificial intelligence acts as an effective assistant offering several different options to support the designer's thinking process around the challenging food material. Design students have also over-considered the actual challenges of preparation of food products. These issues could be avoided by making the concepts speculative from the outset – and essentially only conversational – through discursive design.

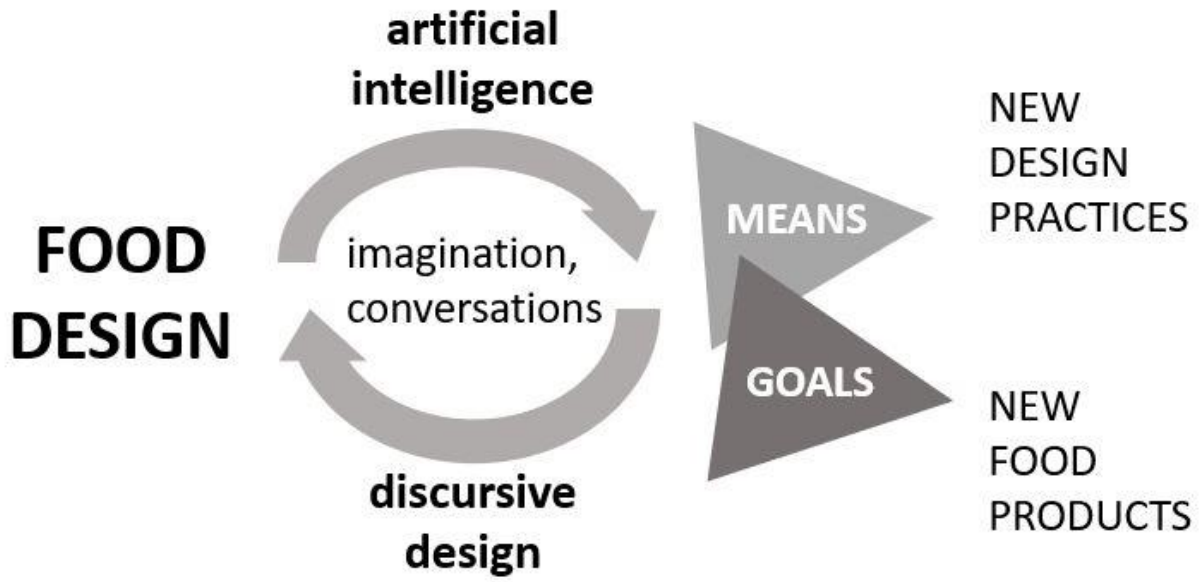

Figure 1. A framework for constructing new meanings in food design.

Discursive design takes design prototyping and conceptualization beyond the usual by distorting reality – possible in some way but not completely believable (Tharp & Tharp 2018; Dunne & Raby 2013), while minding responsibility. Paying attention to consequences must also be present in speculation with AI. Artificial intelligence is not yet capable of interpreting or reproducing complex social interactions, nor of empathy or strategic

thinking, and therefore the human role is emphasized (Markovitz 2024). Creating new visions of the future and especially the topic of food requires responsibility and consideration.

The designer's challenge is to address a topic through a scenario that resonates with the perspective and language understood by people (Tharp & Tharp 2018). Even if the content of a discursive design work is ambiguous, a more familiar presentation helps the examination. This can be facilitated with AI, making visual communication easier and less open to interpretation while the refined visuals can support the design process and the associated self-confidence also reinforcing speculation. The designer acts like a storyteller when utilizing rhetorical contexts to give them additional meanings, and interactivity makes the discursive scenarios more credible for creating discussion (Malpass 2017). With the assistance of AI, the goal should not necessarily be flawless appearance but rather deepening of the presented discourse. Seeing design thinking as sensemaking clarifying also the sensibility of designers (Rylander Eklund et al. 2022) connects it with discursive design as well.

Just as discursive design will not provide clear solutions to issues, the same applies to AI. However, finding problems and discussing them are valuable outcomes. Discursive design can also identify areas for development that other fields than design could address. A more empathetic approach could help companies prepare for change, and interactive experiences can be used to create new, more fun interventions in the food sector (Hermannsdóttir et al. 2016; Altarriba Bertran et al. 2020). Speculative food-related experiences created with AI and discursive design can probe consumer opinions, being also a unifying factor bringing different actors in food-related fields together to discuss common topics.

6. Conclusions

The vagueness and strangeness of food as a designed material will be aided by the use of AI in the sketching and ideation processes, freeing the designers from the limitations in imagining new kinds of food. Although while imagining different futures of food and using the aid of technology we should recognize ourselves as users being variable and the technology only as a tool creating events we react upon (Ogata & Mizuno 2023), and this is central in the approach suggested in this paper. The use of AI will not be seen creating things for the designers but creating with them, minding a critical lense throughout the design process. AI can help in the visualization of wild discursive concepts, as designers aware of resource limitations often have to consider their ability to materialize the idea and presentability, which in turn prevents detached ideation. Handling difficult or hard-to-visualize materials –such as food – and communicating ideas becomes easier. AI-assistance creates the possibility for even non-designers or people with less advanced drawing skills to collaborate.

AI can help innovators and future users of a new product collaborate making co-creation easier and cheaper. For those who are unable to communicate their ideas in writing or visually, artificial intelligence gives them the opportunity to bring innovations to light. It can also make the priorities, and the time spent on the design process more efficient. If the discursive design approach is intended to bring forth appealing design concepts that

provoke discussion and thought, AI-assisted ideation can be fruitful, but the outputs created by artificial intelligence should also be critically evaluated and discussed.

The usual feedback loop of design work will exist even if we let go of the conservative idea of who is a designer and with what ways the results of designing will be achieved. The use of AI-assisted sketching and ideation could therefore bring more democracy into design and its' true participatory goals. We are not suggesting AI-assistance to replace the traditional sketching but rather using its help involving a wider range of people sharing their ideas of future eating. People have all the thoughts and potential ideas, but they might need help with using the right language.

The discursive design method claims the aim of finding problems rather than solving them as one its main goals. It suggests, or provokes, discussions on different topics. The discursive design and participatory methods also share a deep belief on the voice of people mattering, and on making a change by activating thinking. Discursive design works are aimed at the people, the participants of making sense of the discursive scenarios. The meaning is created at the moment when the audience reacts: as co-creators of the work.

The theme of food concerns all humans. It is relevant to expand the democratic opportunities of participation in designing the future of food with the help of AI-assisted visualization and communicating issues with speculative future scenarios with discursive design to which everyone is able to respond to, without special design skills needed. Creating change requires combining new methods and new roles.

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Chapter 5

INFORMATIONAL ISSUES

Information and Interaction Design & Trust in Information

Track leader: Karl Pineau, PhD

Media Design Lab director - L'École de design Nantes Atlantique

ethical leadership
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A Study on Readers' Willingness to Accept the Digital Transformation of Popular Science Magazines: A Case Study of "Nature History" Magazine

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ABSTRACT | In the context of media convergence, traditional popular science journals are facing the challenge of transitioning to digitalization in new media. Public reading habits are gradually changing, with fragmented reading becoming a common phenomenon, forcing popular science journals to reposition their methods of communication. Nature History magazine, as a representative, is actively promoting its digital transformation, primarily targeting young readers. The magazine integrates online and offline resources, establishing a digital content distribution system and proposing development strategies such as "content plus service" and "Internet plus popular science." However, unlike general information, popular science information is distinctive, and readers tend to trust printed media more than digital content, which leads to relatively low trust in digital science communication. Therefore, building readers' trust in digital popular science content has become a core issue in the transformation process of science magazines. This study, taking Nature History magazine as a case study, explores readers' willingness to accept the digital transformation of popular science magazines based on the Unified Theory of Acceptance and Use of Technology (UTAUT2) and the Technology Readiness Index (TRI) theoretical models. The focus of the study will be on digital information design, readers' willingness to accept digital content, and the establishment of trust in the information, aiming to provide theoretical foundations and practical references for the transformation of popular science magazines in the new media environment.

KEYWORDS | Nature History magazine; popular science magazine; digital transformation; information design; information acceptance; information trust

1. Introduction

In the era of new media, information dissemination technologies are rapidly evolving, with mobile internet becoming widely popular [1]. The availability of alternative sources for popular science information continues to increase, and the importance of popular science magazines as a medium of communication is gradually declining [2]. People can now access knowledge through various channels, such as the internet, making the process more convenient and accessible. At the same time, with the rise in knowledge levels and changing interests, readers of traditional popular science magazines are increasingly seeking more specialized and personalized content. Against the backdrop of personalized market demands and diverse choices, the popularity of traditional science magazines is gradually fading, and their readership is becoming more fragmented. On the other hand, the continuous emergence of new media and the rapid iteration of technologies have created an entirely new environment for receiving popular science information.

Nature History is a popular science magazine founded by the China National Geography magazine in 2004, under the supervision of the Chinese Academy of Sciences and the Institute of Geographic Sciences and Natural Resources Research. It is primarily aimed at young readers and covers various fields, including astronomy, geography, biology, and history [3]. Despite its relatively short history, Nature History has gained significant recognition among young audiences, laying a solid foundation for its digital transformation [4]. In response to the rise of new media and the segmentation of reader interests, as well as the challenges of internal reform and upgrading in traditional popular science magazines, Nature History has developed an innovative practice that emphasizes content development, building digital platforms, and enhancing brand value [5].

In line with these new forms and strategies, Nature History has constructed a digital content dissemination system that incorporates various formats and channels. This system integrates the magazine’s official website, Weibo, WeChat, Douyin, Bilibili, and other digital platforms to provide readers with personalized information options.

The difference between popular science information and general information lies in its specificity, especially in the context of digital dissemination, where the credibility of popular science information becomes more prominent. Although digital content dissemination is fast and convenient, readers still tend to trust traditional print media more than digital science information, leading to relatively low trust in digital content. This presents a critical issue: how to enhance readers' acceptance and trust in digital popular science information during the digital transformation of science magazines has become the core challenge in their transformation process.

This study will take Nature History magazine as a case study, utilizing the Unified Theory of Acceptance and Use of Technology (UTAUT2) and the Technology Readiness Index (TRI) theoretical models to explore readers’ willingness to accept the digital transformation of popular science magazines. The focus of the research will be on digital information design, readers' willingness to accept digital content, and the establishment of trust in the information, aiming to provide theoretical foundations and practical references for the transformation of popular science magazines in the new media environment.

Figure 1. Nature History Magazine

Weibo account "Nature History Magazine" WeChat Official Account "Natural History" Douyin account "Natural History"

Figure 2. Digital Communication Platform System of Nature History Magazine

2. Theoretical Models and Research Hypotheses

2.1. Theoretical Models

UTAUT2 (Unified Theory of Acceptance and Use of Technology 2) is an extension of the original UTAUT (Unified Theory of Acceptance and Use of Technology) model, proposed by Venkatesh and colleagues in 2012. It aims to provide a more comprehensive explanation and prediction of users' acceptance and usage behaviors regarding technology. UTAUT2 expands on the original UTAUT model by incorporating additional variables related to user experience and behavioral motivation to adapt to the usage scenarios of modern consumer technologies and services, especially in the domains of individual behavior and consumer technology. The model primarily includes factors such as Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Price Value, Hedonic Motivation, and Habit [6,7].

The TRI (Technology Readiness Index) model is used to assess users' psychological readiness to accept technology, particularly their state of acceptance when encountering new technologies. The TRI model was proposed by Parasuraman in 2000 and primarily explores an individual's attitude and emotional responses to new technologies, especially in the context of technological innovations and digital products. The TRI model is based on four dimensions: Optimism, Innovativeness, Discomfort, and Insecurity, to analyze users' level of acceptance towards technology [8,9].

In the study of digital transformation of popular science magazines, UTAUT2 and TRI serve as the theoretical foundation, aiming to explore young readers' willingness to accept digital science magazines. By combining these two models, a comprehensive analysis of the psychological motivations and acceptance behaviors of young readers facing the digital transformation of science magazines can be conducted. UTAUT2 focuses on the multidimensional influences on technology usage behaviors, while TRI emphasizes users' technological readiness [10,11]. The integration of both models provides a multidimensional perspective for optimizing the digital transformation of popular science magazines in areas such as content presentation, system design, promotion strategies, and user support. This approach can enhance young readers' willingness to accept, increase their participation, and foster loyalty. The UTAUT2 and TRI models provide a solid theoretical framework for the study of young readers' acceptance willingness, offering in-depth insights into various influencing factors and providing strong support for formulating precise and effective transformation strategies.

2.2. Research Hypotheses

1.Application of the UTAUT2 Model in the Digital Transformation of Science Magazines

Performance Expectancy refers to the degree to which an individual believes that using a particular technology will enhance their work or life performance [6]. It is similar to the perceived utility of the technology, meaning that users believe the technology can help them achieve their goals effectively. If young readers believe that a digital science magazine can improve their learning efficiency or provide easier access to science knowledge, they are more likely to accept and use this digital platform. Based on this, the following hypothesis is proposed:
Hypothesis 1: Performance Expectancy has a positive impact on young readers' acceptance intention.

Effort Expectancy refers to the expected effort or cognitive investment required to use a technology, essentially the user's perception of the difficulty or ease of using the technology [6]. If the digital science magazine provides a simple and easy-to-use experience, reduces the learning curve, young readers will be more likely to accept and continue using the platform. Based on this, the following hypothesis is proposed:
Hypothesis 2: Effort Expectancy has a positive impact on young readers' acceptance intention.

Social Influence refers to the degree to which individuals are influenced by their social circles, friends, family, colleagues, etc., when using technology. This factor reflects the influence of social networks on an individual's technology choice [6]. If significant individuals in the social circle (such as family, friends, teachers, or experts) recommend or endorse the digital science magazine, it will strengthen young readers' sense of recognition and willingness to use it. Based on this, the following hypothesis is proposed:
Hypothesis 3: Social Influence has a positive impact on young readers' acceptance intention.

Facilitating Conditions refer to the resources and support available to users when they use a technology [6], including hardware resources, network connectivity, and technical support. If young readers have sufficient resources (such as stable network connections, compatible devices, and timely technical support), barriers to using the digital science magazine will be effectively removed, which will improve their willingness to accept it. Based on this, the following hypothesis is proposed:

Hypothesis 4: Facilitating Conditions have a positive impact on young readers' acceptance intention.

Price Value refers to the perceived costs associated with using the technology, including monetary costs, time costs, etc [7]. This dimension assesses whether the value obtained from the technology is in line with the costs paid. If the subscription fees for the digital science magazine are reasonable and it provides high-quality content, readers will perceive good value for money, thus increasing their acceptance intention. Based on this, the following hypothesis is proposed:
Hypothesis 5: Price Value has a positive impact on young readers' acceptance intention.

Hedonic Motivation refers to the enjoyment or pleasure that users derive from using the technology [7]. This factor considers the entertainment value and the enjoyment that may come with using the technology. If the digital science magazine offers entertaining, interactive, and engaging content that brings fun and enjoyment to young readers, they will be more willing to accept the platform. Based on this, the following hypothesis is proposed:
Hypothesis 6: Hedonic Motivation has a positive impact on young readers' acceptance intention.

Habit refers to the automatic behavior that users develop after long-term use of a technology [7]. Habits are typically formed through repeated use, and users may continue using the technology naturally, without making many cognitive decisions. If young readers have already developed the habit of using digital platforms (such as e-books, social media, etc.), they will be more likely to accept the digital transformation of the science magazine and maintain their usage behavior. Based on this, the following hypothesis is proposed:
Hypothesis 7: Habit has a positive impact on young readers' acceptance intention.

Behavioral Intention refers to the degree to which an individual intends to use a particular technology or service. It reflects the individual's intention and plan to use the technology or platform in the future. Behavioral Intention is often a strong predictor of actual usage behavior. Specifically, individuals are more likely to exhibit high usage intention if they believe the technology will bring expected benefits and is feasible to use. Use Behavior refers to the actual behavior of individuals using the technology or platform in real-life situations. It reflects the extent to which individuals adopt and use the technology in practice. Use behavior includes indicators such as frequency of use, duration of use, and level of interaction, and can be measured by observing the individual's actual usage. In the UTAUT2 model, there is typically a positive relationship between Behavioral Intention and Use Behavior. That is, the stronger the behavioral intention, the more frequent and lasting the actual use behavior [7]. If young readers have a high acceptance intention for the digital science magazine, they are more likely to demonstrate actual use behavior. Based on this, the following hypothesis is proposed:
Hypothesis 8: Young readers' Behavioral Intention has a positive impact on Use Behavior.

2.Application of the TRI Model in the Digital Transformation of Science Magazines

Optimism reflects the user's trust and expectations about the benefits that technology can bring [8]. Optimistic users believe that technology can improve the quality of life, enhance efficiency, and provide convenience. If readers are confident in the digital science magazine and believe it can bring convenience and benefits, their willingness to accept it will be higher. Based on this, the following hypothesis is proposed:
Hypothesis 9: Optimism has a positive impact on young readers' willingness to accept the digital science magazine.

Innovativeness reflects the user's degree of acceptance of new technology, especially their attitude toward trying new things [8]. Innovative users are eager to explore and adopt new technologies, typically having a higher tolerance for risk. Young people generally have a stronger sense of innovation and are more accepting of new technologies. If the digital science magazine is innovative, it will be more likely to be accepted by readers. Based on this, the following hypothesis is proposed:
Hypothesis 10: Innovativeness has a positive impact on young readers' willingness to accept the digital science magazine.

Discomfort refers to the user's concerns about potential problems and difficulties when using new technology, particularly feelings of discomfort or inconvenience during the process [8]. If young readers feel confused or uneasy about using the digital platform (such as complex operations or platform instability), their willingness to accept it may decrease. Based on this, the following hypothesis is proposed:
Hypothesis 11: Discomfort has a negative impact on young readers' willingness to accept the digital science magazine.

Insecurity refers to the user's concerns about the security, privacy protection, and data safety of new technology [8]. Concerns may include issues like privacy breaches and information misuse. If readers are worried about the privacy security or data protection of the digital platform, it may affect their willingness to accept the digital science magazine. Based on this, the following hypothesis is proposed:
Hypothesis 12: Insecurity has a negative impact on young readers' willingness to accept the digital science magazine.
In summary, this study constructs a model to explain the willingness of young readers to accept the digital transformation of science magazines, as shown in the figure.

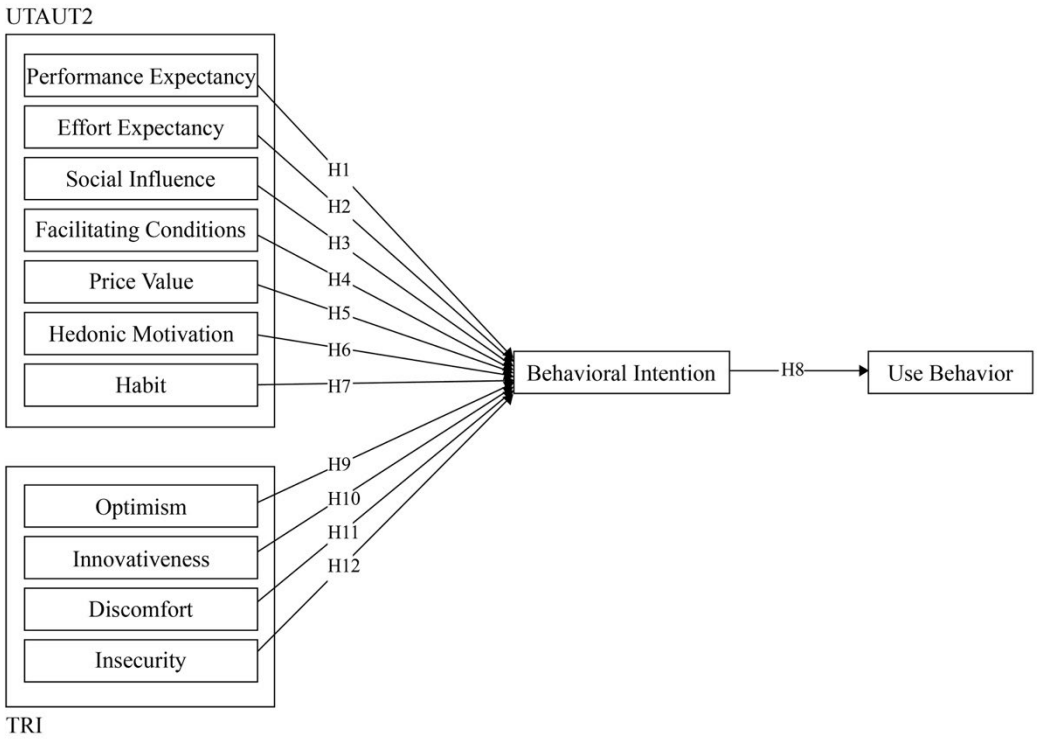

Figure 3. Hypothetical Model of Young Readers' Acceptance Willingness for the Digital Transformation of Nature History Magazine

3. Research Plan and Questionnaire Design

3.1 Research Framework

The research framework of this study consists of three main stages: questionnaire design, data collection, and data analysis.

In the first stage, the questionnaire for this study was carefully designed by combining the UTAUT2 model and the TRI model. The questionnaire is divided into several sections, with each section focusing closely on one specific factor to better collect young readers' willingness to accept the digital transformation of science magazines.

In the second stage, the study plans to collect survey data through both online and offline methods, with the target respondents being young readers of Nature History magazine. For the online portion, the questionnaire will primarily be distributed through social media and digital communities, including platforms like WeChat, Weibo, TikTok, and Xiaohongshu, to collect responses more widely and quickly. The offline collection will involve posting questionnaire posters on university campuses to attract participants. To ensure data validity and coverage, the study will use Tencent's survey platform to distribute the questionnaire to respondents, who will provide feedback based on their willingness to accept the digital transformation of Nature History magazine.

In the third stage, the study plans to conduct comprehensive data analysis using IBM SPSS23 and AMOS23 to ensure the accuracy and scientific rigor of the analysis results. Through in-depth exploration of the data and discussion of the findings, the study aims to draw targeted conclusions and offer recommendations.

3.2 Questionnaire Design

Dimension	Question Item	Question Content	Question Source
Performance Expectancy	PE1	I think that the digital communication channels (such as official website, Weibo, WeChat, Douyin, Bilibili, etc.) of "Natural History" magazine can help me obtain popular science information more conveniently.	Venkatesh [6]; Qasem [10]; Zhang Fangjie [12]
	PE2	I think the digital communication method of "Natural History" magazine can improve my learning efficiency.	
	PE3	I think the content of "Natural History" magazine disseminated through digital means can stimulate my interest in popular science knowledge.	
Effort Expectancy	EE1	I think it is very easy to obtain the content of "Natural History" magazine through digital platforms (such as official website, Weibo, WeChat, Douyin, Bilibili, etc.).	Venkatesh [6]; Qasem [10]; Zhang Fangjie [12]

	EE2	I think it is very simple to search for content through platforms such as Weibo, WeChat, and Douyin of "Natural History" magazine.	
	EE3	I think obtaining the content of "Natural History" magazine through digital platforms will not make me feel confused or overly difficult.	
Social Influence	SI1	My friends recommend that I obtain the popular science knowledge in "Natural History" magazine through digital communication platforms.	Venkatesh [6]; Zhang Fangjie [12]; Qu Linyun [13]
	SI2	I see that many people around me (such as classmates, colleagues) obtain the popular science knowledge in "Natural History" magazine through digital platforms, which has influenced my view of these platforms.	
	SI3	The editors and authors of "Natural History" magazine share popular science knowledge through digital platforms, making me more willing to use these platforms.	
Facilitating Conditions	FC1	I have sufficient equipment (such as smartphones, computers) and network conditions to read the content of "Natural History" magazine disseminated through digital platforms.	Venkatesh [6]; Zhang Fangjie [12]; Qu Linyun [13]
	FC2	I think the digital platforms (such as official website, Weibo, WeChat, etc.) relied on by "Natural History" magazine have extremely high stability. There are very few problems such as lagging and malfunctions during use, always providing readers with a smooth content browsing experience.	
	FC3	I can easily find the relevant resources of "Natural History" magazine disseminated on digital platforms.	
Price Value	PV1	I think the content provided by "Natural History" magazine through digital communication platforms is	Venkatesh [7]; Qasem [10];

		worth the time and effort I invest.	Qu Linyun [13]
	PV2	I think the content provided by "Natural History" magazine through digital communication platforms is of high quality and meets my needs.	
	PV3	I think "Natural History" magazine provides a cost-effective information acquisition experience through digital communication platforms.	
Hedonic Motivation	HM1	Reading the popular science content of "Natural History" magazine through digital platforms makes me feel happy and satisfied.	Venkatesh [7]; Qasem [10]; Zhang Fangjie [12]
	HM2	I feel happy when watching the popular science content of "Natural History" magazine on digital platforms.	
	HM3	I like to obtain the popular science content of "Natural History" magazine through digital platforms with strong interactivity (such as Douyin, Weibo, etc.).	
Habit	HA1	I am already used to obtaining the content of "Natural History" magazine through platforms such as Weibo, WeChat, Douyin, and Bilibili.	Venkatesh [7]; Zhang Fangjie [12]; Qu Linyun [13]
	HA2	I often obtain the popular science knowledge of "Natural History" magazine through Internet media.	
	HA3	Reading the electronic version of "Natural History" magazine has become a part of my life.	
Optimism	OP1	I am optimistic about the digital dissemination of "Natural History" magazine and believe that they can better serve my needs for obtaining popular science knowledge.	Parasuraman [8]; Warden [14]; Na, Tae-Kyun [15]
	OP2	I believe that the content of "Natural History" magazine disseminated through digital platforms will provide more and	

		more learning opportunities and content.	
	OP3	I think "Natural History" magazine can provide me with more convenient ways to obtain knowledge through digital platforms in the future.	
Innovativeness	IN1	I support "Natural History" magazine in using emerging digital communication platforms and innovative technologies.	Parasuraman [8]; Warden [14]; Na, Tae-Kyun [15]
	IN2	I am willing to use the new digital communication platforms or new functions launched by "Natural History" magazine.	
	IN3	I am interested in the innovations of "Natural History" magazine on digital platforms and am willing to experience these new functions.	
Discomfort	DI1	Obtaining the content of "Natural History" magazine through digital communication platforms makes me feel complicated and inconvenient.	Parasuraman [8]; Warden [14]; Na, Tae-Kyun [15]
	DI2	I have encountered technical problems when using the content of "Natural History" magazine disseminated through digital platforms, which makes me dissatisfied.	
	DI3	I am worried that the content of "Natural History" magazine disseminated through digital platforms does not meet my needs or expectations.	
Insecurity	IS1	I have doubts about the authenticity of the content of "Natural History" magazine disseminated through digital platforms.	Parasuraman [8]; Warden [14]; Na, Tae-Kyun [15]
	IS2	I am worried that "Natural History" magazine may disseminate false content through digital platforms.	
	IS3	I am uncertain about the accuracy of the content of "Natural History" magazine disseminated through digital platforms.	

Behavioral Intention	BI1	I am willing to obtain the content of "Natural History" magazine through digital communication platforms (such as official website, Weibo, WeChat, Douyin, Bilibili, etc.).	Venkatesh [6,7]; Qasem [10]; Zhang Fangjie [12]
	BI2	I am willing to recommend to my friends to obtain the content of "Natural History" magazine through digital platforms.	
	BI3	I am willing to continue to use digital platforms to obtain the content of "Natural History" magazine in the future.	
Use Behavior	UB1	I often obtain the content of "Natural History" magazine through digital platforms (such as official website, Weibo, WeChat, Douyin, Bilibili, etc.).	Venkatesh [6,7]; Qasem [10]; Zhang Fangjie [12]; Qu Linyun [13]
	UB2	I often recommend to my friends to obtain the content of "Natural History" magazine through digital platforms.	
	UB3	I will continue to use digital platforms to obtain the content of "Natural History" magazine.	

4. Research Progress and Outlook

4.1 Research Progress

This study aims to explore young readers' willingness to accept Nature History magazine's digital transformation, particularly focusing on its performance and acceptance on digital platforms. So far, the research has completed several key stages:

1. Research Framework Construction and Theoretical Foundation: This study has chosen the UTAUT2 (Unified Theory of Acceptance and Use of Technology 2) model and the TRI (Technology Readiness Index) model as the theoretical framework. These two models effectively explain readers' willingness to accept Nature History magazine's digital dissemination platform and their psychological motivations. UTAUT2 primarily focuses on the multidimensional factors influencing technology usage behavior, while TRI emphasizes users' technology readiness. By combining these two theoretical frameworks, we can better understand the behavior characteristics and acceptance willingness of young readers in the face of digital transformation.

2. Literature Review and Refinement of Research Questions: In this stage, we systematically reviewed the literature in related fields, covering recent advancements in the digital transformation of science magazines, reader acceptance models, and behavioral studies. Through analysis of domestic and international literature, we identified research gaps and innovations, further refining the research

questions. Specifically, we aim to explore which factors influence young readers' willingness to accept and engage with Nature History magazine's digital dissemination.

3. Questionnaire Design and Preliminary Testing: Based on the UTAUT2 and TRI models, the research team designed a questionnaire aimed at young readers. The questionnaire includes dimensions such as performance expectancy, effort expectancy, social influence, facilitating conditions, price value, hedonic motivation, habit, optimism, innovativeness, discomfort, and insecurity, among others. Each dimension includes multiple quantitative questions to measure young readers' willingness to accept Nature History magazine on digital platforms and their psychological motivations.

Currently, the questionnaire has been designed and a small-scale pre-test has been conducted. The pre-test results show that most questions are clear and easy to understand, but a few questions need further optimization. Based on feedback, the research team is adjusting the questionnaire to ensure its comprehensiveness and measurement accuracy.

4.2 Research Outlook

The next steps of the study will focus on the following areas:

1. Formal Implementation of the Questionnaire: After modifying and refining the questionnaire, the study will enter the formal data collection stage. The questionnaire will be widely distributed both online and offline to ensure a representative sample of young readers. Data collection is expected to be completed within the next two months.

2. Data Analysis and Model Validation: Once the data is collected, the research team will use statistical analysis software such as SPSS and Amos to process and analyze the data, verifying the applicability and effectiveness of the UTAUT2 and TRI models in the context of science magazine digital transformation. The relationships between different variables will be explored to reveal the key factors influencing young readers' willingness to accept the magazine's digital transformation.

3. In-depth Analysis and Discussion: Based on the data analysis, the study will delve into young readers' behavior characteristics in digital science magazine dissemination. It will explore how to optimize digital dissemination strategies to enhance Nature History magazine's influence and loyalty among young readers. Additionally, the study will assess the impact of different social media platforms on the dissemination effectiveness of science magazines, providing feasible recommendations for future digital transformations.

4. Writing Research Reports and Papers: As the research progresses, the research team will organize and summarize the data analysis results and write related research reports. We plan to submit the findings to academic journals and conferences to provide theoretical and practical references for the digital transformation of science magazines.

In conclusion, this research will further enhance the understanding of young readers' willingness to accept digital science magazines and offer valuable insights for the innovative transformation of magazine publishing in the digital age.

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Developing an Interactive Mental-Mapping Application with Pictographic Representations through Participatory and Co-Design Methods

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ABSTRACT | This X-Format presents an innovative, tablet-based mental mapping application developed to capture young people's spatial experiences across digital, physical, and hybrid environments. Leveraging a drag-and-drop interface with pictographic representations, the application simplifies mental mapping for digitally adept youth. Employing participatory co-design methods, young adults actively shaped the tool through three methods—User-Guided Blueprinting, User-Driven Iconicity, and User-Driven Visual Language—to define its structure, aesthetics, and functionality. A live X-Format demonstration at the conference offers an interactive demonstration of these methodologies, presenting their effectiveness in establishing trust in research processes through Information Design.

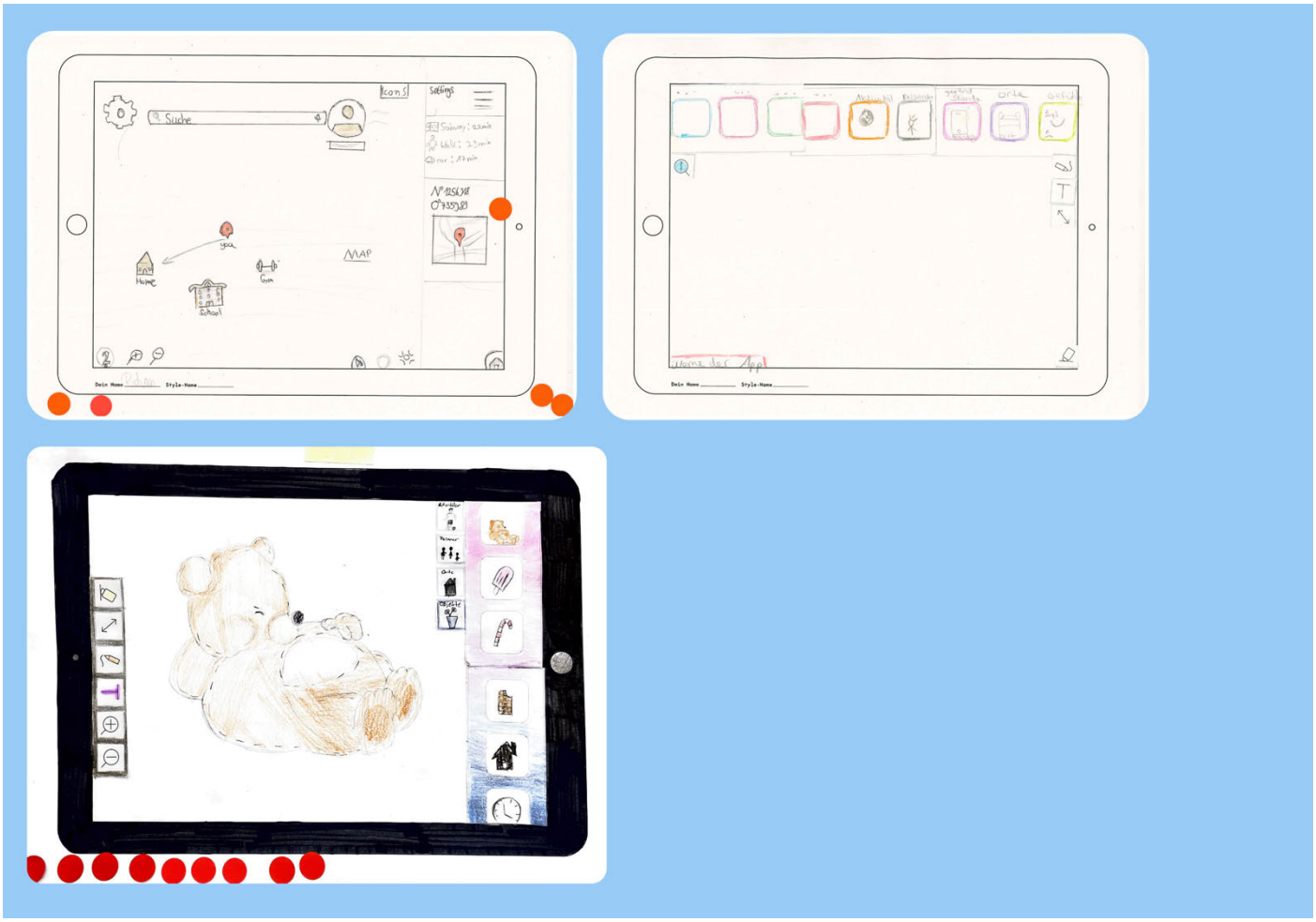
KEYWORDS | information design, trust through co-design, mental mapping, interactive application, participatory design, transdisciplinary

1. Investigating Spatial Perception: Rethinking Mental Mapping

The research project in which this application was developed investigates how young people perceive and navigate the complex interplay between digital, physical, and hybrid spaces. At its core is a mental mapping application designed to capture these spatial experiences, routines, and emotional landscapes of young adults. By integrating traditional mental mapping functionalities with innovative pictographic representations, the application serves as a research instrument that leverages the extensive use of handhold devices by young adults. Rather than requiring participants to produce detailed drawings as in conventional mental mapping research, this approach allows them to simply drag and drop elements to express their spatial understandings. Given that young people are technologically adept, this method comes naturally, potentially enabling them to map not only their physical surroundings but also include the digital spaces they inhabit. A further advantage of this digital-first approach is that, in addition to the qualitative data (the mental maps), it also generates quantitative data—such as timestamps, spatial relationships among pictograms, and precise positions on the canvas— which additionally can be included in the analysis process.

2. Co-Creation Methodologies: Empowering Young Adults through Participation

Central to our methodology is the use of participatory and co-design methods, which not only enhance the relevance of the mental mapping application but also build trust between researchers and participants. Rather than positioning young people as passive subjects, we engage them as active co-creators in the research process itself.
Three primary methods underpin our co-design process: User-Guided Blueprinting, User-Driven Iconicity, and User-Driven Visual Language.
In the User-Guided Blueprinting phase, participants contribute to the structural design of the application, helping to identify key functionalities and organize spatial categories that reflect their lived experiences. The focus then shifts to User-Driven Iconicity, where participants evaluate different levels of iconicity to determine which representations most effectively capture the nuances of their surroundings. This process also involves deliberate exploration of how gender and various socio-political backgrounds should inform the design of these icons. Finally, through User-Driven Visual Language, participants influence aesthetic aspects such as color schemes, typography, and overall branding, ensuring that the application is both functional and engaging. The here presented methods were implemented with young adults in Berlin and Lima.



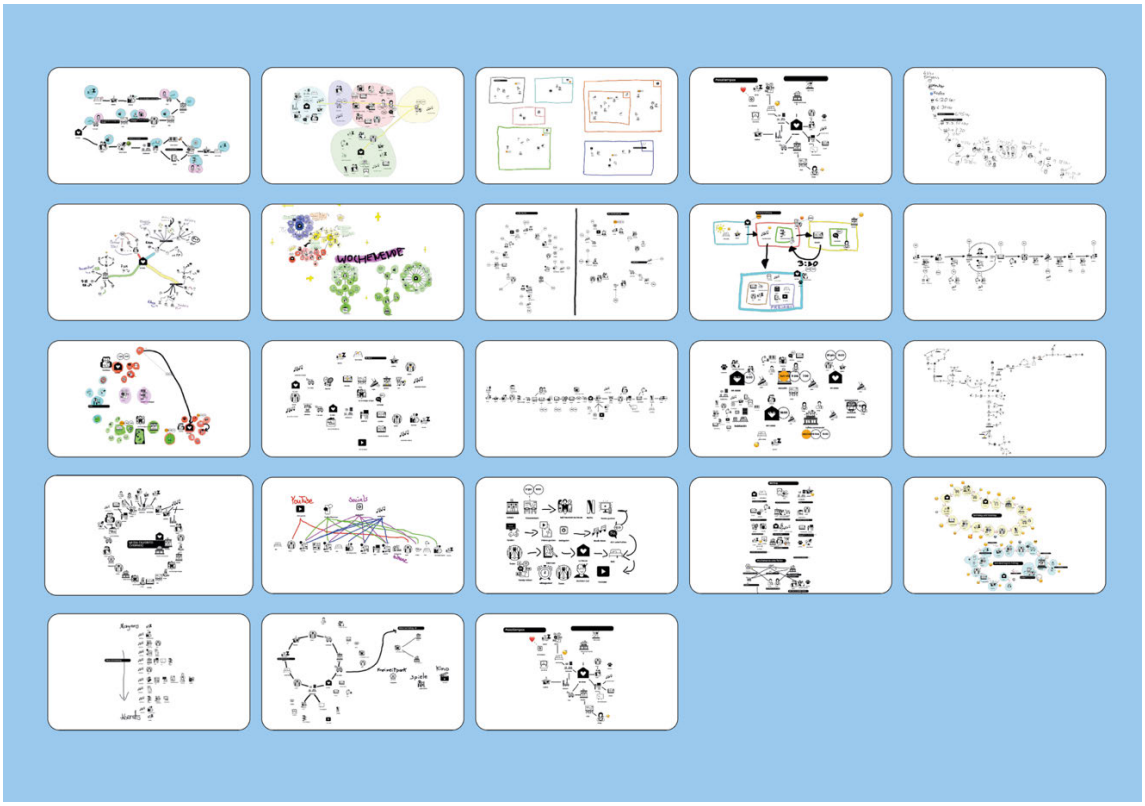
Developed Methodology for participatory User Guided Blueprinting, structuring the Apps visual and content structure, including needed functionalities, ux and ui design and spatial categories.

3. X-Format Engagement: A live Demonstration of Co-Creation

In our conference X-Format session, we will mirror and demonstrate these co-design methods through an interactive workshop. This 30–45-minute session will simulate the full spectrum of our participatory approach. The workshop will begin with a rapid blueprinting exercise, where participants sketch and discuss the fundamental components of a mental mapping tool, highlighting the spatial elements most significant to them. Following this, the session will transition to an iconicity and representation test. Attendees will examine different levels of iconicity, assessing which visual forms best capture their perceptions of space, and they will deliberate on how factors such as gender and socio-political backgrounds should inform the design of these icons. Finally, participants will engage with a live demonstration of the mental mapping application, using it to create their own maps in real time. This hands-on experience not only illustrates the practical application of our co-design methods but also reinforces the trust and collaborative spirit essential to the research process.

Impression of the final Application completely designed through a participatory and co-designed methodologies.

By integrating participatory design with an engaging, interactive format, our approach redefines the relationship between research and its participants. This X-Format session serves as both a demonstration and a call to action for more inclusive, user-driven information design methodologies in research processes.



Selection of created Maps from young adults, showing diverse diagrammatic representations (networks, diaries, matrixes). For anonymity reasons, these maps are only shown as small thumbnails.

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CONSPIRACY FICTION AS A TOOL FOR CRITICAL THINKING. DESIGNING EMBODIED NARRATIVES BASED ON CONSPIRACY THEORIES TO REFLECT ON CONTEMPORARY ISSUES AND COMMUNICATION DESIGN.

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ABSTRACT | Conspiracies are a form of narrative, and each piece of information is also, in part, a form of narration. Stories are a fundamental part of culture and our way of perceiving reality. As stated by Harari, humans "are the only species with the ability to use language—not just to describe things we can see, taste, and touch, but also to invent stories about things that don't exist" (Gallo, 2024). Storytelling permeates every aspect of daily life and is used as a tool to give meaning to products, services and experiences. This phenomenon extends to the news, where the boundaries between facts and storytelling are more blurred than ever. Communication is largely driven by social media platforms, which have fragmented the information landscape. Informing has become a participatory practice: news and opinions are shared widely across many platforms, often leaving people struggling to make sense of events and phenomena.
Originally designed for entertainment, social media platforms now host all forms of communication. However, the way these platforms are built favours the content that answers their original purpose. Information has evolved in the form of opinions and storytelling to adapt to the algorithms. In this environment, conspiracy theories thrive.
The trust in the sources of information is dramatically low. The news volume and the speed at which they travel make verifying the sources increasingly difficult. In Italy, only a third of

news readers report trusting the media, reflecting deep scepticism toward information channels seen as driven by political or commercial interests (Reuters Institute for the Study of Journalism, 2024).
Communication designers need to be trained to operate in such a complex landscape. Our proposal presents the aims and results of a Communication Design Studio at the Bachelor level in Politecnico di Milano. Students were asked to research conspiracy theories and craft a project that would make the effects and consequences of these beliefs tangible and real.
The studio consists of shaping a scenario in which the conspiracy theories are found to be true, followed by the design of a fictional brand and an interactive experience revolving around a prototype set within the scenario. The studio aims to develop communication design ecosystems within an anti-disciplinary approach, adopting a speculative design framework.
Students are prompted to discuss the role of communication and interaction design in building public trust. The topic of conspiracies is a tool for reasoning about the ethical dimension of storytelling and their responsibility as communication designers. The projects aimed to challenge preconceived opinions and instil self-doubt in the viewer, fostering a critical attitude that encourages deeper engagement with the complexity of issues.

KEYWORDS | CONSPIRACY, COMMUNICATION DESIGN, SPECULATIVE DESIGN, INTERACTION

1. Introduction

Nowadays, society is asked to tackle new political, environmental, and social issues, which are not only complex to understand, but also feel unprecedented to a vast majority of people. The idea that we are living in the “darkest timeline” or just the “wrong timeline” has gained increasing popularity within online communities, and can be interpreted as a sign of a wider feeling of uncertainty and distrust towards national and international authorities (Salvia, 2022).
With the weakening of previously trusted authorities and what they claimed as true, the ontological nature of “truth” itself has been questioned. As Harari (2024) states:

> ‘Truth’ is understood as something that accurately represents certain aspects of reality. […] Truth and reality are nevertheless different things, because no matter how truthful an account is, it can never represent reality in all its aspects.

If reality can’t be grasped by any form of truth, information can be completely unrelated to both truth and reality:

> What the example of astrology illustrates is that errors, lies, fantasies, and fictions are information, too. Contrary to what the naive view of information says, information has no essential link to truth, and its role in history isn’t to represent a preexisting reality. Rather, what information does is to create new realities by tying together disparate things […]. (Harari, 2024)

The “naive view of information” can be a risk, as people tend to believe that, by gaining more information, they will eventually reach some form of truth. However, the overwhelming flow of contrasting information in the era of digital communication is the proof that opposite theories about the same topics can not only co-exist, but also feel credible and true to digital and traditional media users.

> It’s not only a matter of an unhinged circulation of news, an increased amount of

> information that we are subject to and our difficulty in processing a flow of events that nowadays runs at increased speed. The feeling, if anything, is an impression of a qualitative change. Only a few years ago, it seemed to us that the world still made sense. Today it doesn't make sense anymore. The result is that, at this point, we are not even sure if this sense ever existed. (Salvia, 2022)

This feeling of confusion and disorientation regarding the information provided by media, can be further analysed through what Byung-Chul Han (2015) defines as "Transparency Society". Transparency is a fundamental trait of the contemporary digital world, in which anything is manifest, easily accessible, already revealed. Transparency is then distant from both truth and knowledge, which must be searched and unveiled. From this point of view, digital media contributed to a weakening of true/false and good/evil dichotomies, which were previously set by the dominating narrative: this weakening is an opportunity for new and old counter-narratives to flourish, and for contradictory elements within these theories to exist.
Social media also act as an echo chamber for such theories, as people have constant access to information that reinforce their beliefs (Hood, 2023).
Moreover, in this historical moment, western society lacks a single "source of truth" as the authorities we relied on after WWII have become decreasingly influential and their narrations lack the credibility they had before, whether true or not. As stated by Reuters Institute for the Study of Journalism (2024) in their Digital News Report: "[…] across the world, much of the public does not trust most news most of the time."
The trust in the sources of information is dramatically low. The amount of news and the speed with which they spread make source verification increasingly challenging. In Italy, only one-third of news consumers report trusting the media, highlighting widespread skepticism toward information channels perceived as being influenced by political or commercial interests (Reuters Institute for the Study of Journalism, 2024).

The weaknesses, contradictions, and injustices of our society are now exposed, as they are no longer covered by a dominating source of truth. In this context, no matter how intricate or unbelievable conspiracy theories may appear, to a certain degree, they always address worries that are related to real, tangible issues.

> If we don't settle for a mere debunking, if we actually listen, we find not only seeds of truth, but also warnings towards real dangers that loom over us. (Wu Ming 1, 2023)

The popularity of conspiracy theories rises when people, instead of relying on official and rational explanations for their worries, tend to believe in narrations that feel more epic, despite them not being sufficient to explain extremely complex problems. The need for engaging narratives, together with the decreasing popularity of journalism, politics and other traditional "sources of truth," caused a viral diffusion of conspiracy theories and counter-narratives. As stated by Bianchi (2021):

> At the basis of every conspiracy theory, in fact, there is the idea that historical processes are the result of a perfect causal concatenation of events: something that can be planned from start to finish. […] However, as psychology has demonstrated since Freud, in many cases we don't even really know what we want and we often behave in a completely irrational way. […] As sociology and political science have long pointed out - social systems are complex, which sometimes generate unpredictable and unexpected situations.

2. Before Misinformation: The Narrative Structure of Conspiracy Theories

Every conspiracy theory is based on the idea that historical processes derive from a perfectly orchestrated causal sequence, magnifying intentionality beyond measure. Everything unfolds by meticulously following the conspirators' plans as if history were completely manoeuvrable by human beings (Bianchi, 2021). Psychology, however, teaches us that, as human beings, we often act in deeply irrational ways. Similarly, sociology and political science have long pointed out that social systems are inherently complex, capable of generating unexpected and unpredictable events that "have a life of their own and generate consequences that no one expected" (Butter, 2020).
To understand conspiracy theories, distinguishing between "complicated" and "complex" systems is necessary. A complicated system is characterized by a concatenation of simple events, which are consequential to each other; in contrast, a complex system is composed of elements that coexist without immediate and predictable relationships (Bertalanffy, 1968). Conspiracy theories tend to reduce the complexity of reality to a complicated, linear structure, offering seemingly coherent explanations but ignoring the unpredictable nature of social phenomena. In general, the conspiracy has the form of an articulated storyline, cum-plicated, with folds. In contrast, the nature of an event is cum-plexus, with plexuses, which are parts of a whole interacting with each other (Fig. 1). Thus, we have at the base a complex system in which events happen and a complicated narrative superstructure, that is essentially linear and accessible, but convoluted. As mentioned earlier, the conspiracy always arises from one or more real events, builds on a point of contact with reality, and builds a narrative that rests on itself.

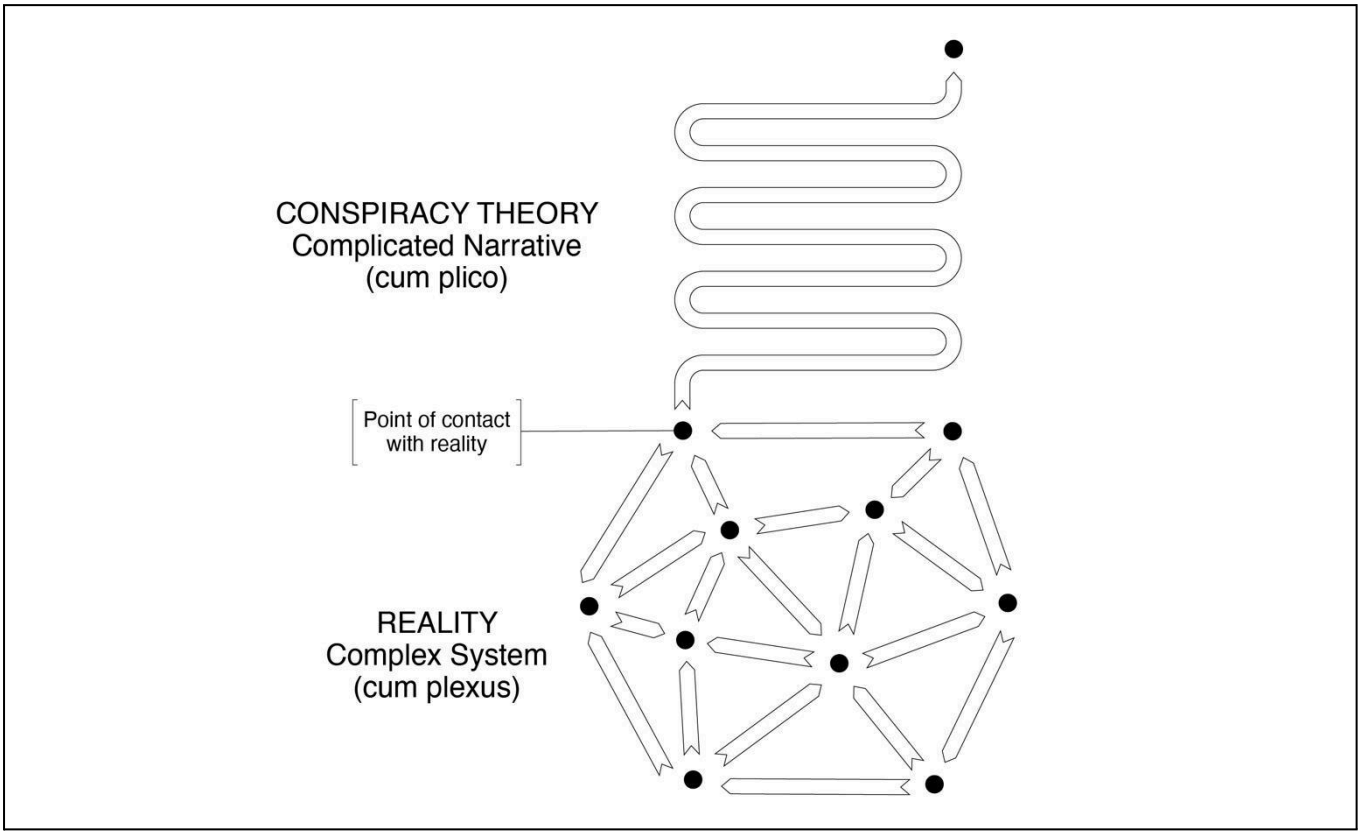

Figure 1. Conspiracy as a complicated narrative and reality as a complex system. Conspiracy structures do not take into account the complexity of reality but repurpose a narrative complication (authors, 2025).

Delving into a phenomenon's complexity offers a less compelling story, requiring more critical thinking and cognitive effort. The ease of thinking that goes with complicated narratives allows a free association of ideas, creating a narrative flow that seems natural and intuitive. Daniel Kahneman (2011) describes this phenomenon in his book "Thinking, Fast and Slow," where he distinguishes between "fast thinking" (intuitive and automatic) and "slow thinking" (analytical and deliberate). Conspiracy theories fit neatly into the first system: they are easy to understand and offer satisfactory answers to complex questions. It is important to note that the conspiracy theorists are not reductionists, people who simplify reality. On the contrary, they tend to possess vast information, but they associate it in a completely arbitrary way. Conspiracy theorists complicate reality, generating intricate and articulate conjectures and stories.

> Conspiracy theories - feverishly creative, meticulously concocted - are, in fact, fictional stories that some people believe with conviction. Proponents of conspiracy theories link real data and imaginary data into a coherent and emotionally rewarding version of reality. [...] They fascinate us because they tell compelling stories with the classic problem-based structure and a clear definition of good and bad guys. They offer bleak and sensational plots that are easily transformed into exciting popular entertainment. (Gottschall, 2013)

Gottschall (2013) points out how each individual possesses, to some extent, a kind of "inner Sherlock Holmes." This mental mechanism has the function of retroactive reasoning from present observations, identifying possible causes of the observed effects. This evolutionarily adaptive narrative capacity allows people to perceive reality as an ordered system with meaning, avoiding being overwhelmed by chaos. The narrative mind, however, is allergic to uncertainty and constantly seeks meaningful patterns in the external world; if it cannot find them, it tends to impose them.
Thus, conspiracy theories are, before being disinformation, attempts by conspiracy theorists to construct a coherent narrative in a fragmented world; they are not a mere simplification of reality but a more satisfying complication.

3. Worlds Within Worlds: The Role of Communication and Speculative Design

As information systems provide an increasingly fragmented view of reality, the role of communication in building public trust through clear and cohesive narratives becomes crucial.
Narratives are an essential dimension of communication design and our way of understanding and experiencing the world. "As Immanuel Kant pointed out in 'The Critique of Pure Reason', if there is an objective reality, it is unknowable. All we can know is the reality we construct. That reality takes the form of a story" (Wilson, 2005).
Stories shape our experience of the world and define how the world exists for us. Through a communication system, it is possible not only to express a point of view on reality but also to create an alternative version of it, imposing new order and meaning on some of its elements. This set of meanings can be defined as a narrative, a value system, or a world.
As Ian Cheng (2024) states, "A world allows one to live in a different world than we would in the chaos outside. A world creates consensus about what is relevant. A world assigns meaning to certain actions within it." A world is therefore a system within another world, governed by laws and values that are coherent and valid therein.
Within the C1 Final Synthesis Studio of the Communication Design course at the School of Design, Politecnico di Milano, students are invited to create worlds within worlds —

narratives to critically reflect on the complex challenges facing our society.
Communication design obviously plays a role in these relevant issues, however, traditional design methods alone can't entirely grasp them.

> To address such problems it is necessary to adopt a transdisciplinary approach, capable of overcoming the separation between natural sciences, social sciences, and the sciences of the artificial, outlining the profile of a designer whose task is to select results from heterogeneous disciplinary fields in order to reveal analogies and isomorphisms, activating a transdisciplinary circulation of concepts. (Pizzocaro, 2000; Scagnetti et al., 2007)

The methodological approach of the Studio draws from the practices of speculative design, a branch of design that engages with complexity through a process "that implies to cope with wicked problems, where the goals are uncertain and the solutions are many and sometimes at odd." (Scagnetti et al., 2007).
With its critical and provocative stance, speculative design enables the exploration of crucial issues in contemporary society, which are deeply embedded in our daily lives.
By constructing scenarios set in hypothetical futures or alternative presents, students tackle topics such as climate crisis, loss of privacy, and institutional power—complex challenges that do not offer immediate or definitive solutions.
The complexity of these themes and the impossibility of finding meaning or logic in such central yet ordinary questions become fertile ground for the emergence of conspiracy theories. As Mattia Salvia (2021) writes in the introduction to the issue of "Iconografie" magazine titled "Apparenze. Sulle estetiche del complottismo":

> The general point, of which I am convinced, is that conspiracy theories are a kind of wunderkammer that contains the paroxysmal expression of the spirit of the times — the zeitgeist, which is indeed the title of a famous conspiracy documentary — of society.

There is a very tight relationship between the forms taken by conspiracy theories over time and the vulnerabilities of the period in which they developed.
Addressing this theme means immersing oneself in stories constructed to cope with the dramas of current historical reality — narratives that seek to provide answers to otherwise unsolvable questions.
The topic of conspiracy theories provides an important opportunity to examine the ethical role of stories and communication design in shaping our understanding of the world and our approach to such central and complex issues. As creators of narratives through communication systems, designers need to reflect on both the power and impact of the stories they create and those that surround them, developing a responsible and ethically aware stance towards their profession.

4. Final Synthesis Studio Design Methodology

The brief of Final Synthesis Studio C1 2024/2025 was to build a speculative scenario where a particular conspiracy theory is considered true. Within this scenario, students must build a communication design project that can indirectly communicate this world.
Eleven themes were selected from the proposals individually identified by students during an initial research phase. These themes include: *Moon Hoax* (the belief that the Moon landing was a historical fabrication), *Birds Aren't Real* (the theory that birds are actually surveillance drones), *Reptilian Theory* (the idea that alien elites live among us in disguise to manipulate humanity), *Tinfoil Hat* (a supposed method of protection against

mind-control waves), *Water Fluoridation* (the belief that fluoride in drinking water is used to degrade cognitive abilities), *VIP Island* (the theory that celebrities believed to be dead are actually alive and hidden on a secret island), *Project Blue Beam* (a conspiracy about a staged global event to establish absolute control), *Mandela Effect* (the idea that collective false memories stem from parallel realities), *Rubber Fruit* (the belief that synthetic or chemically altered fruit is used to poison people), *Plandemic* (the claim that global pandemics are deliberately orchestrated), and *Voting Pencil* (the suspicion that pencils provided in polling stations are rigged).

Students worked in teams of five to six people, in which each member took on a specific role based on their skills and interests. After being assigned a theme, they explored and deconstructed its narrative through in-depth research and critical analysis. They then created a fictional brand that could plausibly exist within the chosen scenario, applying the knowledge and expertise gained during years of study. Building on this foundation, they developed a core concept and a communication strategy, which they then translated into a multidimensional and multichannel execution by selecting relevant media and touchpoints. The identity ecosystem revolves around a product or object proposed by the fictional organization or company: the *Communicative Machine*.
Communicative Machines are prototypes that serve as the linchpin of immersive narratives. By functioning as a kind of narrative catalyst, these interactive devices invite users to engage with fictional worlds. According to Mitrović (2016), these diegetic objects have the power to materialize narratives, allowing users to suspend their disbelief and fully immerse themselves in the story. Beyond their role as entry points into fictional realms, Communicative Machines can also be seen as "provotypes" – design artefacts that provoke reflection and discussion among diverse stakeholders (Casnati et al., 2024; Boer & Donovan, 2012). This concept underscores their capacity not only to entertain but also to stimulate critical thinking and dialogue. Furthermore, these machines are part of a broader communication ecosystem that includes touchpoints designed to provide users with a comprehensive understanding of the narrative universe. These communication ecosystems form narrative systems, comprising touchpoints, artefacts, and interactive devices.

In developing *Communicative Machines* during the prototype-making phase, students delve into tools such as Arduino alongside coding environments to interactively engage with technological processes — a practice highlighted by Lukens and DiSalvo's (2012) emphasis on integrating technology for enhanced fluency. The goal here is not specialization but acquiring literacy across various toolsets; understanding which methods best translate concepts into tangible artefacts through appropriate mediums like print or code-based platforms (Cangiano, 2016).
Coding and prototyping intersect with communication design and visual systems, fostering work that moves across domains. Instead of adhering to fixed categories, students approach communication design as a space of convergence. Bernstein (2011) highlights how working with technology often requires crossing disciplinary lines. A speculative design perspective leads students to explore media and tools beyond standard methodologies, enabling them to experiment with techniques and references from diverse fields (Mitrović, 2019). Lukens and DiSalvo (2012) describe speculative design and technological literacy as inherently cross-disciplinary, framing design as an ongoing process of inquiry and integration.
This process follows an evolving, anti-disciplinary model that moves beyond structured methodologies. Rather than assembling multiple disciplines, it draws fluidly from different areas (Childress, 2016; Brin, 2016) and resists fixed specializations. This approach shifts from solving predefined problems to framing new questions (Blauvelt & Davis, 1997). In this process, iteration is fundamental, allowing students to work within areas where expertise is

still forming. Prototyping progresses from initial exploration to refined development through hands-on engagement. This aligns with the concept of "thinkering" (Antonelli, 2011), where understanding emerges through direct interaction and repeated refinements. Trial-and-error cycles inform each stage, from ideation to completion, reinforcing an adaptive design process (Berglund & Grimheden, 2011).

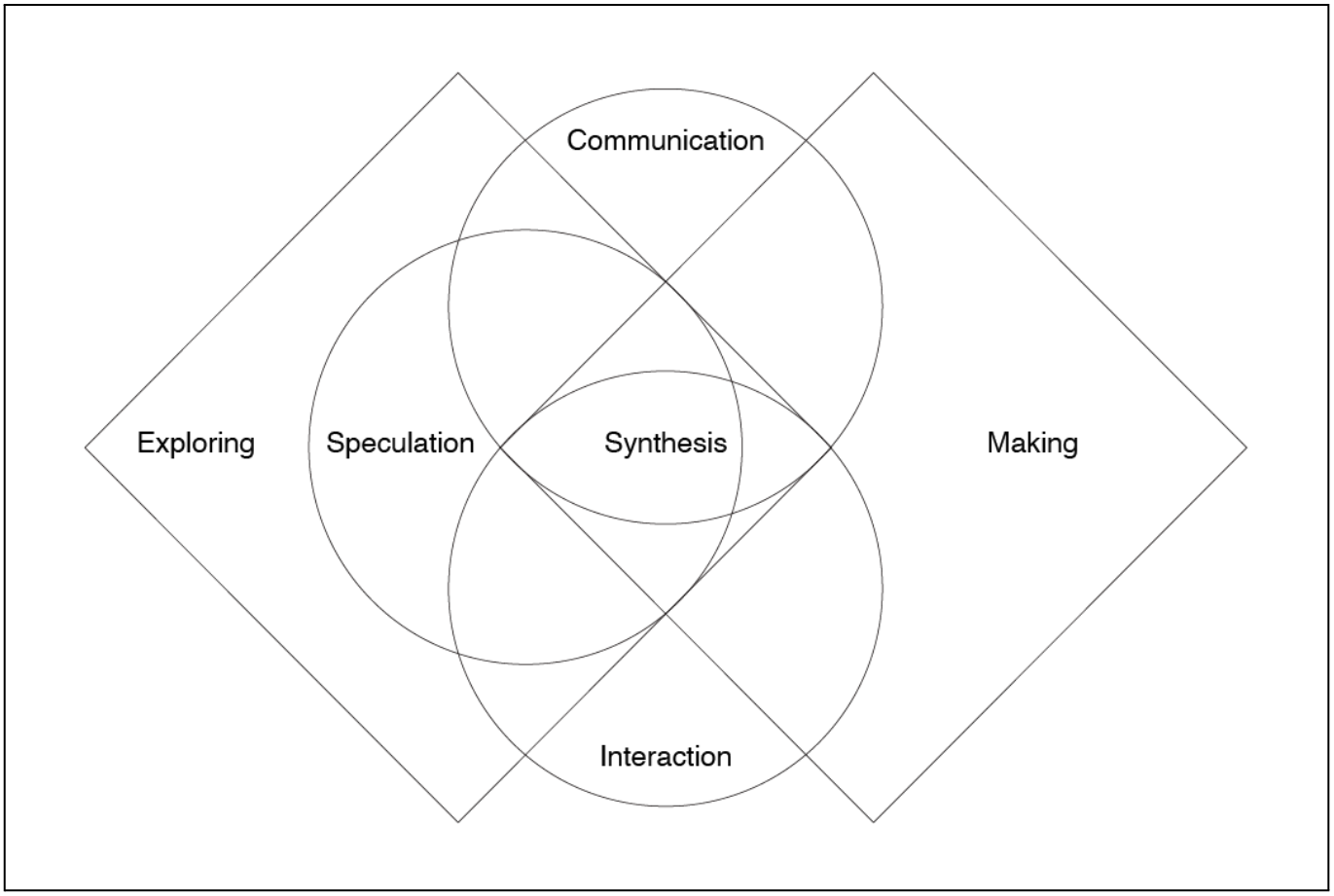

Figure 2. Speculative Overlapping Double Diamond (authors, 2023).

The learning-designing process can be summarised in five main parts, two overlapping phases crossing three design areas, as it is in the Speculative Overlapping Double Diamond model (Fig. 2):

- Exploring: the phase of research on the assigned subject.
- Speculation: scenario building, what if, concept definition, narrative.
  Communication: from concept to visual identity, defining a communication strategy into and out of the narrative.
- Interaction: definition of the prototype's main functions and the experience's user journey, considering all the touchpoints consistently to the communication strategy.
- Making: the phase of building and verifying the prototype through progressive refinements.

The overlap of the various phases and areas, defined as Synthesis, is indeed the moment of transformation into key intermediate project outputs. In the central area, where the

exploration gradually stops (converging) and the making begins (diverging), the project's genesis occurs. The field represents the transition from definition to development. The central Synthesis overlap merges into a Define-Develop phase.

In this design framework, conspiracy theories as a design tool represent an unconventional approach to stimulate critical debate. As mentioned, students are invited to create fictitious brands and *Communicative Machines* based on conspiracy theories to explore the narrative and emotional dynamics that make these stories so persuasive. This process does not aim to perpetuate misinformation but to deconstruct it, highlighting the inner workings and social implications. Through this approach, conspiracy theories become tools of provocation: they pose questions and invite students to think critically about the underlying issues. The project ultimately becomes a generator of uncertainty.

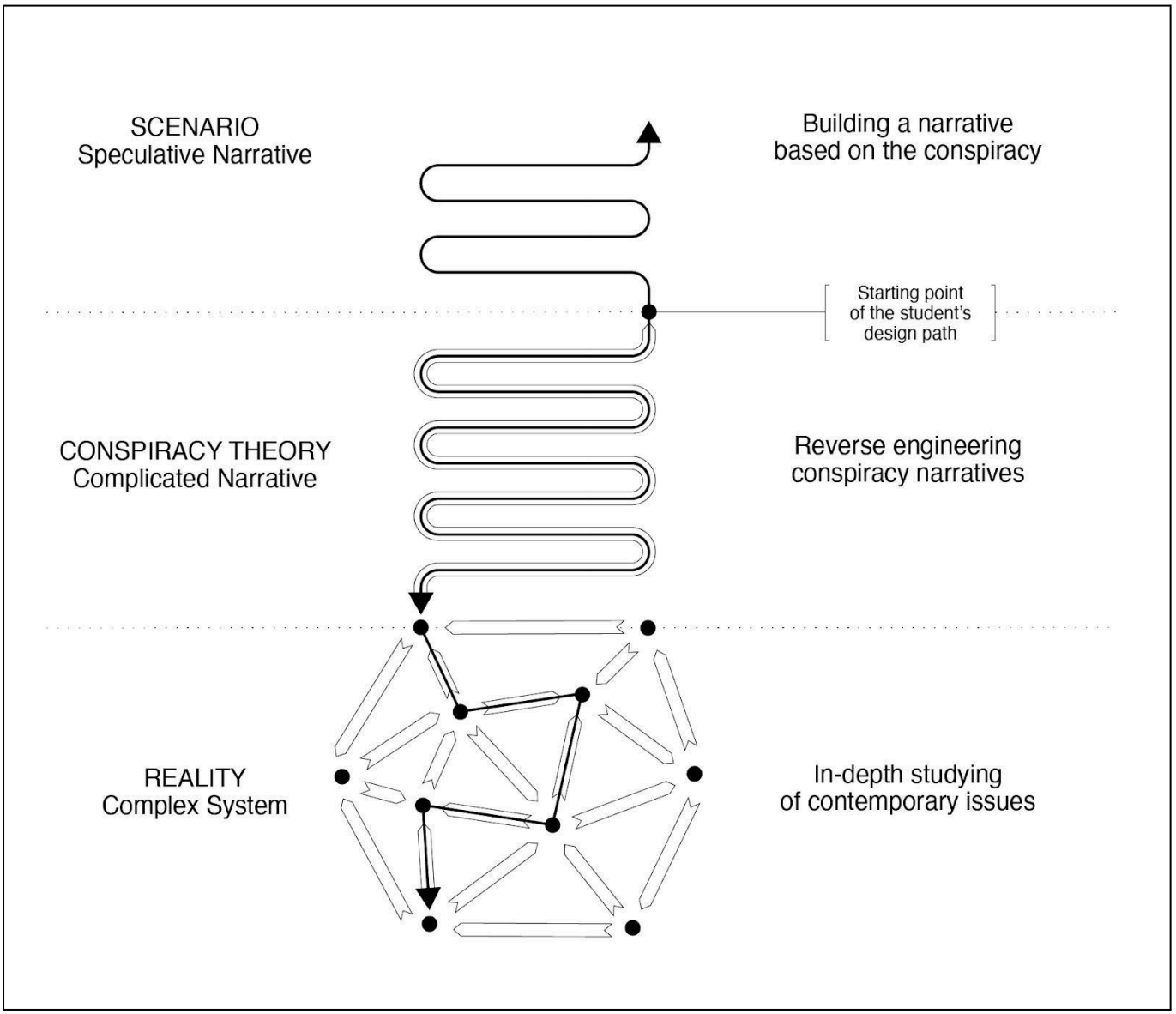

Figure 3. Student's design process path made during the 2024/2025 Final Synthesis Design Studio C1: starting from the analysis of the conspiracy narrative, through the study of the problematics it brings out, to the construction of a speculative scenario.

In summary, during the studio, students embark on a backward design journey (Fig. 3), starting with the plot to analyze and understand its narrative structure through the reverse engineering process. This approach leads them to examine and deepen the system of

matters that the conspiracy brings to light, both as a communicative phenomenon and as a manifestation of the tensions and issues from which it originated. Finally, once the narrative mechanics of the conspiracy are established, a speculative scenario is built upon it by integrating logic from the theory into the design output. The aim of this exercise is to provide the students with the tools to analyse these narratives, developing a critical approach that allows them to distinguish between the initial complex issues and the convoluted responses given to them.

5. Selected Design Results

To understand how the vision of the Studio has been re-interpreted by the students, the following paragraphs briefly describe a few projects from the 2024/2025 Final Synthesis Design Studio.

The first project is based on the so-called Plandemic, a conspiracy theory that argues that the COVID-19 pandemic was not entirely accidental and that the virus may have been deliberately released or manipulated to achieve broader goals, such as increasing control over populations or pushing specific political agendas. The project consists of a conspiracy theory within a conspiracy theory: the group of hacktivists ANTI-STREAMING ARMY discovers that the pandemic was planned by the Digital Content Consortium (D.C.C.), a powerful lobbying group representing the world's largest streaming platforms. Their investigation reveals secret communications between the D.C.C. and influential institutions, pointing to their role in exploiting the pandemic to earn new subscribers and increase their profits, cementing their dominance over global media consumption. The hacktivist group decides to reveal their knowledge by broadcasting the content of encrypted messages found by analyzing frames from popular streaming content. From billboards in city squares to digital ads on major websites, the group of hacktivists takes over these communication channels and replaces their content with the truth about the pandemic. Citizens are then invited to build themselves a digital tool that enables the detection of hidden messages within movies and series hosted by the most popular streaming platforms: the ANTI-STREAMING ARMY provides all of the instructions to create this device and keep spreading the truth.

This project is a fine example of the research and design process promoted by the Studio: deconstructing the conspiracy theory, understanding its logical connections, to recreate a new narrative that takes a critical stance. The students highlighted the social issue that gave rise to the conspiracy theory in the first place: the fear and suffering related to the period of the pandemic, but they also took into consideration the inevitable reliance that people had on entertainment to carry on (Fig. 4).

Figure 4. Anti Streaming Army (2025). E. D'Ancona, G. Ferrari, F. Morsia, F. Pecorari, M. Pina, F. Zannoni.

A different take on criticism towards contemporary means of communication can be seen through guMMM: a project that starts from the conspiracy theory of rubber fruits—which is the belief that, in the US, some fruits are fake or filled with rubber. By choosing this theory that spread through TikTok and Instagram, the students propose a reflection on the manipulative power of digital communication tools on influencers and users. This

conspiracy theory has in fact been born through videos and images of fruit that looks and behaves like gum, shared by common social media users and the students imagined that an actual brand took advantage of this viral phenomenon by sending gummy fruits: a remark on the predominance of the images through digital means of communication, which often blend the boundaries between imagination and truth.

Figure 5. guMMM (2025), E. Bonaiuti, L. Collaviti, J. Pace, M. Quendoz, A. Ragazzo, R. Villanueva.

guMMM is a brand that, with a funny yet bold tone of voice, produces and sells rubber fruit to assess the performance of influencers on TikTok. guMMM's products include rubber fruits of various types—bananas, mangoes, and watermelons—that are sent to influencers, who must demonstrate and prove their skills in manipulating objects and showcasing their characteristics. The more they stretch and bend the fruit, the higher their score will be. After the influencer creates a promotional video manipulating the fruit, the experience concludes with the final ranking of the best TikTokers (Fig. 5).

Figure 6. Habit System (2025), E. De Beni, G. Galenda, A. Parente, A. Santocchi, G. Stanziano.

Other critical aspects of contemporary society, which involve a lack of privacy and lack of representation within politics, have been analysed in the project Habit System. Starting from the conspiracy theory of voting pencils—which argues that votes expressed through a pencil are too easy to manipulate and that there is no value in voting within a corrupt system—Habit System proposes a complete overhaul of the voting method.
The new voting system is based on the recording and processing of data related to the daily actions of citizens, including those in the digital sphere. Every choice—such as purchases, media consumption, participation in public events, and other activities—is tracked through a vast network of electronic devices and digital platforms that collectively determine a vote for one of the two parties that make up the new political landscape: the Conservative Party and the Progressive Party.
There is no separation between the moment of voting and everyday life: the political result becomes a constant and accurate reflection of citizens' habits. Voting becomes a direct and unalterable expression of people's real needs, a dynamic process that evolves with society itself.
In a historical moment when voter abstention is increasing year after year, and people place more trust in CEOs than in governments (Elkind, 2021), changing the voting method would represent a true revolution. The project reflects on the issue of lack of privacy and data collection by companies and governments, using these concerns to raise awareness about abstention and the lack of political representation. Byung-Chul Han (2021), reflecting on these topics, asks himself if democracy and traditional forms of voting still make sense in a society that lacks a public sphere of dialogue, where isolated digital citizens are not able to create an actual common ground for a shared ideology (Fig. 6).

6. Conclusions

The experience at Final Synthesis Studio C1, with its speculative approach, led students towards the deconstruction and reconstruction of conspiracy theories' narratives. At first, students entered the world of their conspiracy theory, then they identified the characteristic elements, and eventually, they extended that world through a variety of communication artefacts.

Apart from the research and design process that has been carried out by the students inside the classroom, the aim of the studio is also to show the projects to external observers. In fact, after the end of the studio and after the projects have been evaluated by the teacher and assistants, an exhibition is usually organised to let the students themselves show their projects to the public. This year, this confrontational moment is even more significant as it brings back to the public the narrations that have been born outside the academic context. The students will be able to reflect on their projects and how they are received by the public; the observers will have the chance to experience a new point of view on some narrations they probably already know about.

It's not the Studio's role to define what is true and what is not, however, it serves as an invitation for both students and observers to avoid accepting any narrative as is; to have a critical approach enriched by the tools of speculative design. Avoiding misinformation and the spread of fake news is a crucial topic of our time, however, the tools of debunking and "prebunking" have often proven to be ineffective (Bianchi, 2021).

The psychologist Jovan Byford (2020), who has been studying conspiracy theories for twenty years, has developed six "rules of engagement" on the website The Conversation, one of which is to find a "common ground", the kernel of truth on which conspiracy theories are based. The goal, in fact, is not to make conspiracy theorists less curious or less sceptical, but to change the direction of their curiosity and scepticism. Along this path, the projects carried out during the Studio propose a method of doubtful thinking, which does not seek an immediate solution but knows how to linger.

Even if it's not possible to embrace the complexity of the world as a whole, the tools of speculative design can help people at least identify it and point out its critical aspects with irony and sharpness.

> The pandemic hasn't been planned by some billionaires in cahoots with governments. Vaccines are not weapons of mass extermination. No anonymous user on the internet will defeat paedophilia with questionable prophecies. Reptilians from another dimension did not take over heads of state to launch useless and bloody wars. Economic crises are not deliberately set by a handful of Jewish bankers who meet secretly in a cemetery, or on the upper floors of a skyscraper in some metropolis. The climate emergency was not triggered by chemtrails.
> It's all much scarier than that; therefore, everything is incredibly more difficult to accept. "The world is a ship adrift," Moore reiterates, and no one really has control of the rudder. (Bianchi, 2021)

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DESIGN, DIALOGUE, DEMOCRACY: POST-TRUTH AND THE CRISIS OF POLITICAL PARTICIPATION

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ABSTRACT | Healthy, functioning democracies depend on a body of shared beliefs whose truth is not in serious question. In many societies today, this condition does not obtain. Between innocent misinformation and intentional disinformation, the "post-truth" regime characterizing modern societies has left people unable to debate political values because they cannot agree on basic facts. Behavioral scientists claim to locate the source of the post-truth phenomenon in a general propensity toward certain types of cognitive error, often thematized under the rubric of "cognitive illusions." Intractable and incorrigible, such illusions underpin a distinctive pessimism about the prospects for rational human action, which has led in turn to workaround strategies such as "nudging," an effort to design choice situations that steer individuals toward actions that accord with axiomatic accounts of reasoning. Against this conventional social-scientific view, the authors advocate a more ambitious application of design in defense of democracy. Offering an analysis inspired by American philosopher John Dewey, we characterize misinformation not as a series of inaccurate beliefs held by individuals but as a maladaptation between individuals and their larger social environments. On this analysis, rehabilitating genuine political participation is the most promising way to overcome the epistemic fragmentation and confirmation bias that are the hallmark features of the post-truth regime. As a paradigm of adaptive and integrative intelligence, design contains important capacities for addressing and remediating these problems but may also help to accelerate flows of misinformation. Accordingly, the paper concludes with a discussion of several recent developments in design theory that highlight ways contemporary design practice may itself be contributing to the current post-truth condition, while also pointing out the potential of design for countering misinformation, not through post hoc strategies like nudges but by

promoting greater critical media literacy among users of internet-based communication platforms, thus encouraging a more broadly shared understanding of problems that are confronting contemporary societies.

KEYWORDS | MISINFORMATION, BEHAVIORAL SCIENCE, ADAPTIVE INTELLIGENCE, PARTICIPATORY DESIGN, PREBUNKING

1. Lippmann and Dewey: Technocracy or Democracy

> "If there is a dividing line between liberty and license, it is where freedom of speech is no longer respected as a procedure of the truth and becomes the unrestricted right to exploit the ignorance, and to incite the passions, of the people." (Lippmann, 1955, p. 126)

In this famous statement, the American political journalist Walter Lippmann identified a problem at the heart of modern democracy: the ease with which the norms, rights, and institutions of free expression can be distorted, whether inadvertently or intentionally, altering people's beliefs and attitudes in nonrational ways that degrade the political process. In contemporary contexts this has come to be referred to as the problem of "misinformation," a word used generically in this paper to mean falsehoods circulating among individuals that bear on matters of politics and public policy. Lippmann's claim that people not only can be, but in fact regularly are, misled for political advantage has received substantial empirical grounding in recent decades, in part through the scientific exploration of psychological biases and "cognitive illusions" that alter people's judgment (Kahneman, 2011, pp. 26-28, 216-217). The science has shown how, for example, sensational news media accounts of particular crimes tend to exaggerate people's sense of overall rates of crime, and thereby their support for "law and order" political agendas and candidates. For some researchers, our susceptibility to such illusions, and their frequent exploitation by politically interested parties, leads to a distinctive pessimism about the prospects for rational action under an ostensible "post-truth" regime characterizing modern societies. One prominent contemporary response to this pessimism is "nudging," a strategy for leveraging common cognitive biases in service of beneficial outcomes by guiding individuals toward actions that accord with conventional accounts of rationality such as rational choice theory (Thaler & Sunstein, 2008/2021; see also Marcelle & Robb, 2024). Although the nudge strategy rejects Lippmann's call for the direct administration of public affairs by specialist experts, claiming to respect people's freedom by making nudge initiatives relatively easy to ignore or avoid, both approaches to combatting misinformation nevertheless exhibit a strongly technocratic understanding of modern liberal societies. And "nudge theory" in particular envisions a specific political role for designers, who are to be enlisted as part of an expert elite which frames the way information is presented to the public, influencing popular opinion by orienting people toward considerations that the experts deem relevant to a given policy dispute. A pop-up message asking social media users to consider the accuracy of a news item before reposting it is an example of a nudge targeting misinformation, illustrating the approach's characteristic combination of paternalistic guidance with the individual's freedom to ignore the

guidance (OECD, 2022, p. 15). Simply put, this particular application of behavioral science to the political arena, like Lippmann a century ago, proposes to steer public opinion for the public's own good, having despaired of more traditional approaches like informing or educating.

Responding to an earlier statement of Lippmann's technocratic recommendation, the American pragmatist philosopher John Dewey acknowledged that "those who have ability to manipulate social relations for their own advantage have to be reckoned with" (Dewey, 1927/2008, p. 341). And like contemporary behavioral scientists, he recognized that this manipulation of popular opinion is more than a superficial matter of substituting easily disproved false claims for truthful ones, since it gets much of its power by leveraging deep-seated and widespread "emotional habituations and intellectual habitudes" (p. 341). Despite these points of agreement, however, Dewey's general position differs both from Lippmann's and from the contemporary program of nudging. For whereas the technocratic perspective understands the problem of political misinformation mostly in terms of a failure of *individual* citizens to think clearly (OECD, 2022, p. 4), for Dewey misinformation reveals the irreducibly *social* nature of human rationality. In his words, "knowledge is communication as well as understanding" (1927/2008, p. 345), and rationality, therefore, is not the correspondence of individual belief and objective reality, but the cooperative, intelligent resolution of experiential problems as they arise. Thus, the problem of misinformation is above all a "social pathology" (p. 341). It is best understood as a *maladaptation* among the constituents of a social and political environment: a distortion in the process of inquiry by which communities pursue adaptive solutions to problems through a process of open communication aimed at mutual understanding, accommodation, and compromise. From Dewey's perspective, therefore, rearguard actions like asking individuals to consider the truthfulness of a social media message before reposting it focus on symptoms, not root causes, and will be of only limited help as a result.

Dewey's understanding of rationality as social intelligence accords a much greater importance to democracy than do pessimists like Lippmann or contemporary nudge theorists. Far from being a merely mechanical procedure for achieving majoritarian rule by tallying up pre-existing individual preferences, democracy for Dewey represents an epitome of reasoning as such: it is a quintessential manifestation of social intelligence oriented to the resolution of shared real-world problems. Clarifying the import of his recasting of individual rationality as adaptive social intelligence embodied in communication, Dewey states that "there is no limit to the . . . intellectual endowment which may proceed from the flow of social intelligence when that circulates by word of mouth from one to another in the communications of the local community." (pp. 371-72)

2. From Participatory Design to Design for Participation

Dewey saw most of the problems of American democracy as resulting from a failure to secure the effective involvement of the people impacted by the concrete issues of the day. The crisis of democracy analyzed by Lippmann was, for Dewey, really a crisis of

political participation, to be addressed by finding ways to include nonspecialists in thinking through the consequences of various policy proposals, thereby increasing the breadth and depth of social intelligence being applied to them and enhancing the legitimacy of the resulting political agendas. Dewey's commitment to participatory democracy suggests a new framing for the possible political role of design. Perhaps most obviously, if a lack of genuine participation is the ultimate source of the social and political pathologies afflicting contemporary democracies, it is natural to ask whether "participatory design"—a well-established field of practice which actively seeks to include end-users in the creative development process—might serve as a method or model for ameliorating the crisis of political engagement. Despite the clear merits of maintaining a more inclusive design practice in many contexts, however, the specific issue of political misinformation may not be the most promising area for the application of this method. One reason is that the participatory creation of public policy recommendations would appear to remain far too susceptible to precisely the kinds of biased and self-serving misinformation that is undermining contemporary democracy. There's no guarantee, in other words, that a "co-creation" process seeking to establish a discrete political agenda under the auspices of "free speech" might not become one more source of just the sort of ignorant, bigoted, or incurious discourse that needs to be counteracted. The participatory design program, at least as it is typically described in the literature (e.g. Sanders, 2015; Simonsen & Robertson, 2013), risks relinquishing too much control over the development process to be helpful in combating misinformation, and thus may not effectively address the problem pointed out by Lippmann: the ease with which public opinion can be redirected toward nonpublic ends. In regard to the problem of political misinformation, a sincerely held desire to move design practice in a more "democratic" direction, or to "include all voices," might in fact have precisely the opposite effect—further effacing the "dividing line between liberty and license" Lippmann correctly identifies as an essential boundary within political discourse in a functioning democracy.

A second, more conceptual problem with applying participatory design methods to the challenge of misinformation is that the putative consensus envisioned as the outcome of a participatory design process may itself be in tension with the essential meaning of democracy in the context of contemporary, pluralistic societies. Total agreement on any complex issue is likely an impossibility, and may not be an appropriate goal even in principle. The rehabilitation of a more genuinely participatory democratic process, therefore, must involve establishing opportunities for people to *disagree*, albeit in reasoned and respectful ways. Discussing challenges of participatory design based on their long experience in the field, Erling Bjögvinsson, Pelle Ehn, and Per-Anders Hillgren stress that in political contexts, design should focus on creating "a common place where conflicts can be negotiated"—a focus that acknowledges the "diversity of perspectives, concerns, and interests" characterizing modern societies (Bjögvinsson et al., 2012, p. 102). This goal, of keeping political conversations going while opening people to other perspectives, yields a view of design's political role that contrasts with the consensus-seeking orientation of conventional participatory design. For much the same reason, Bjögvinsson and colleagues' discussion also deviates from the prevailing "user-centered" paradigm of industrial design, in which an iterative prototyping process is supposed to converge toward a

final artifact suitable for mass production. By contrast, they argue, in the context of political discourse within modern democracies, a key rationale for professional design can be understood as helping to "transform antagonism into agonism, moving from conflict between enemies to constructive controversies among 'adversaries'—those who have opposing matters of concern but who also accept other views as 'legitimate'" (p. 109). Design's political role, the authors suggest, should consist in encouraging, *while also structuring*, political participation: mitigating the polarizing effects of misinformation while also accounting for the fact that "political communities are characterized by heterogeneity and difference . . . They are in need of platforms or infrastructures, 'agonistic' public spaces—not necessarily to solve conflict, but to constructively deal with disagreements" (p. 116).

3. Design, Technology, and the Reconstruction of Participatory Democracy

Political misinformation, whether deliberately or inadvertently circulated, undermines the conditions of genuine democratic participation, replacing opportunities to learn about others' concerns with invitations to an uncritical tribal affiliation and an unreasoned suspicion of outsiders. As is well known, social media has today become a main vector of misinformation. Contrary to the rhetoric of "connectivity" that has helped social media platforms become a ubiquitous feature of everyday life, in many cases these platforms are instead helping to create populations fragmented into mutually antagonistic groups defined by ideology or by cultural, racial or ethnic identity. The algorithms that power these platforms actively contribute to this fragmentation, rewarding members for maximizing "engagement," including by trafficking in reductive stereotypes, provocative half-truths, and baseless conspiracy theories.

Several recent writings by design scholars illuminate some specific ways in which contemporary design practice has contributed to the problem of misinformation, while suggesting corresponding ways that design might help to counteract this problem by promoting more informed types of political participation. In general, these writers point to the increasing untenability of the user-centered paradigm for design in the face of rapidly emerging developments in digital technology. Jodi Forlizzi, for example, sees a growing gap between the primary values of user experience and interface (UX/UI) design, which continue to prioritize a single user, and the current reality of web-based communication platforms, which can serve millions of users at once. An overly narrow focus on creating an intuitive user experience, she argues, is now preventing designers from fully accounting for the broader ecosystem of internet-mediated communications; accordingly, she calls for a more self-consciously "stakeholder-centered design" (Forlizzi, 2018, p. 22). In the case of misinformation disseminated through social media, Forlizzi implies, the stakeholders include recipients as well as propagators (of course recipients of misinformation may become propagators in turn, through liking or reposting). A stakeholder-centered approach to UX/UI design, therefore, would involve expanding the frame of reference to consider potential recipients of web-based communications, and the harm that

recipients, and the wider society, may suffer if those communications contain inaccuracies. Such an expansion would dramatically alter the focus of UX/UI design, reducing its predominant emphasis on "user-friendliness" and inviting the development of new features designed to elicit more thoughtful and deliberate—that is, more intelligent—postings and replies in the social media space.

An even more radical challenge to contemporary design practice stems from a reflection on the rapidly developing technologies of machine learning and artificial intelligence. As Elisa Giaccardi and Johan Reström point out in a comment with direct relevance to the problem of political misinformation, devices like smart phones are becoming "autonomous or semiautonomous entities that increasingly do business with humans and with each other" (Giaccardi & Reström, 2020, p. 34). In other words, networked computational technologies, which observe, learn, and refine outputs such as newsfeeds based on prior user engagement, have *themselves* become de facto stakeholders of design, possessed of an independent and growing agency that must be accounted for in the development of new products and services. The emergence of networked devices reinforces Forlizzi's point about the narrowness of the user-centered paradigm for design, clarifying not only how this paradigm insufficiently accounts for stakeholders other than the individual user, but also how it can undermine the interests of users themselves. At present, interface design mostly keeps hidden the massive networks that link the user to other people, and to computational entities like bots. With the algorithmic provenance of most items in their newsfeeds opaque, users cannot know how those items ended up in their feeds, or the intentions (or identities) of the producers of those items. Of course when an item is reposted, that opacity is preserved and extended to other users. The ensuing dynamic is more or less the opposite of what Dewey would have recognized as a democratic process of intelligent social inquiry, which draws the members of a community together in thinking through a shared challenge.

The upshot of these analyses is that, in facilitating the proliferation of misinformation, the very smoothness and seamlessness of contemporary UX/UI design is now having a debilitating effect on public discourse and social intelligence. Technological change has overtaken the operating principles of user-centered design, superseding a main achievement of the field and increasingly turning it into a liability. Recognizing and responding to this supersession, Marzia Mortati argues that henceforth, design expertise and creativity must be applied further upstream in the development process. The emerging challenge posed by networked machine learning and AI will necessitate a change in the role designers play, combining their traditional form-giving activity with "a sociological role, where a project starts from problem setting (or the understanding of the most pressing challenges) to provide hands-on support for transformation to communities and organizations" (Mortati, 2023, p. 31).

Today, internet-mediated political misinformation easily qualifies as one of the "most pressing challenges" facing democratic societies. Design needs to turn its attention and capacities to this challenge, to which it has itself contributed through its focus on frictionless UX/UI. As noted earlier, nudge initiatives represent one kind of design response,

effectively applying the goal of frictionless-ness to outcomes deemed appropriate by the designers (or their employers) themselves, but bypassing the reasoning capacity of individuals and preventing opportunities to apply a more adaptive social intelligence to the issues, as Dewey recommended. Given their downstream location in the communication process, in which users are asked to consider verifying the truthfulness of a message only at the point of reposting (i.e. *after* they have read the message, possibly being influenced by any misinformation it contains), nudges represent a primarily passive, post hoc approach to combating misinformation. Focused on symptoms, not causes, nudging to counter misinformation consists in inviting users to try to debunk material they have already read—a method that relies on the users' motivation not to share falsehoods within their social networks. A more proactive and promising approach is suggested by the psychologist Sander van der Linden's program for "inoculating" individuals against misinformation through the strategy of "prebunking," his term for warning people *in advance* about the types of misleading message they are likely to encounter online, while simultaneously providing tools for seeing through and rebutting them (van der Linden, 2023, pp. 169–194). These tools might be developed as browser extensions that scan social media newsfeeds, calling out possible misinformation based on keywords or phrases or on the origin of messages, and pointing users toward additional journalistic, historical or scientific context. Or they might take the form of a standalone app or web presence to which users could refer in thinking about the controversial issues of the day and in developing their views and opinions on them, providing a structured communication environment designed to ensure that the "dividing line between liberty and license" is maintained. In sum, van der Linden's proposals suggest a possible role for design that aligns with Dewey's call to bolster socially adaptive forms of intelligence focused on shared problems, that avoids the pessimistic paternalism characteristic of the nudge strategy, and that hints at the enormous potential in the "problem setting" approach to design recommended by Mortati.

The challenge posed by political misinformation has elicited a range of proposals for countering it. The top-down technocratic management of public discourse recommended by Lippmann, and given scientific backing and designerly sophistication by nudge theory, misconstrues the social nature of intelligence and the indispensable value of democracy as the preeminent venue for the manifestation of intelligence. A wide-open participatory design approach to hosting public policy conversations remains susceptible to the same techniques of manipulation Lippmann first identified, and imports a goal of consensus that fails to account for the legitimacy of ongoing disagreement and agonistic debate within pluralistic societies. But a renovated design practice, attuned to the social environment beyond the user interface, and sensitive to the technological dynamics that are making networked devices stakeholders of design in their own right, will recognize design's proper upstream role, oriented to setting rather than solving problems. Regarding the misinformation crisis, a problem-setting design attitude yields a goal of prevention rather than cure, and points toward educating users in the techniques of manipulation as "the way of the future" (van der Linden, 2023, p. 275) in the design of web-based communication platforms.

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DESIGN, GREENWASHING AND DATA VISUALIZATION. Visualizing the unsustainability of sustainability as a strategic ethical tool through design

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ABSTRACT | The carbon footprint and greenwashing concepts are interlinked in their impacts on consumer perceptions and behaviors related to sustainability. The rise of greenwashing has the potential to make it complicated for consumers to understand genuine sustainability and thus may lead to distortions in their perceptions about the habits related to sustainability. Such misrepresentation can lead consumers to believe that they are making environmentally responsible choices, as the communicated motives for environmental policies can affect public perceptions of greenwashing. The cognitive biases that consumers exhibit in response to greenwashing serve to further complicate the landscape of sustainability. Extant literature suggests that consumers often face difficulties in recognizing real sustainability efforts and greenwashing. This can result in a process called moral decoupling, where the consumer may rationalize their purchases despite knowing the product is really not sustainable. Thus, the portrayal of sustainability habits contributes to the overconsumption and degradation of the environment through misleading consumers to feel responsible for what they have been doing, which is wrong. Data visualization is important in addressing these challenges that emanate from greenwashing. By effective visualization, the consumer is helped to comprehend such complex data regarding carbon footprint and sustainability issues. Presentation of data in a more transparent and accessible way could also improve consumer awareness and support better decision-making. In fact, understanding the data on sustainability is of paramount importance for building trust. In the light of the above, the paper puts forward that embedding awareness of one's carbon footprint, avoiding greenwashing bias, and presenting effective data visualisation represent an inalienable key aspect of design to promote sustainable consumer behaviour and an ethical use of sustainable data. The following research will collect, interpret, and visualize data related to the sustainability behaviour of a structured sample of people, illustrating how consumer behaviours are unsustainable if biased by greenwashing activities. They

show the role of information design as an important guiding strategy for consumers to orient themselves within the complex landscape of environmental questions and find their way to the truth.

KEYWORDS | INFORMATION VISUALIZATION; DATA VISUALIZATION; GREENWASHING; SUSTAINABILITY

The growing understanding and recognition of climate change and its multifaceted impacts underline the urgency and challenges of environmental communication in the contemporary world. Effective communication strategies are vital for articulating the urgency of environmental issues and prompting public action. Evidence suggests that portraying climate change as an acute crisis improves environmental activism; for example, Vu et al. (2020) demonstrate how international NGOs use social media to mobilise audiences and action. Andersen (2023) offers a similar critique of existing communication efforts for failing to convey the urgency of the situation sufficiently and argues that better public outreach is necessary. Because environmental problems are often quite complicated, this requires a careful approach to communication. Willoughby and Smith (2016) investigate the intersectionalities of health and environmental communication and suggest repurposing well-established strategies from one field to the other. Royne et al. (2016) also point to the complexities of environmental messaging and advocate for tailored marketing approaches to facilitate maximum impact. There is increasing recognition of the role of digital platforms in environmental discourse, but limited research into their potential. Ardoin et al. (2013) acknowledge the potential of social media in environmental education, whereas Kadykalo et al. (2021) highlight that the accessibility of communication is crucial to the successful transmission of urgent environmental science. Based on these perspectives, we can conclude that there is a need for more nuanced, targeted approaches to communication that would be more effective in informing and engaging people on environmental matters.

1. The Phenomenon of Greenwashing

Most disturbingly, 'greenwashing'-or the issuance of false, inaccurate, or deceitful environmental information by companies-is a concept of increasing prevalence. This number has grown within recent years along with the emerging demands for greater accountability from end consumers. The term greenwashing, first introduced in 1986 by Jay Westerveld, has evolved to encompass a wide spectrum of corporate behaviour prioritising image management over actual stewardship of the environment (Miao et al., 2023). Researchers generally define greenwashing as the deliberate attempt to mislead customers about a firm's environmental record or the environmental benefits of a product (Nisa et al., 2023). Greenwashing can take many forms, including vague or inflated sustainability claims, selective disclosures of environmental data, and misleading eco-labels that do not adhere to stringent criteria (Lu, 2024). Greenwashing has serious implications, not least in terms of undermining trust and fostering scepticism surrounding corporate sustainability. Consumer awareness of (and scepticism towards) the disparity between corporate claims and actual environmental performance is increasing, and scepticism towards sustainability messaging is also deepening. This growing mistrust is compounded by the prevalence of greenwashing; it not only erodes trust in individual brands but also disseminates distrust across the overall market, thus undermining the credibility of sustainability credentials (Mu, 202). Research indicates that

if consumers perceive a company as engaging in greenwashing, they may extend their scepticism beyond that offending brand, adversely affecting the perceptions of other businesses within the same sector (Sari, 2023). This erosion of trust can, therefore, dissuade consumers from purchasing green products altogether, stalling the expansion of the sustainable market (Nisa et al., 2023).

In addition to undermining consumer confidence, greenwashing compromises the integrity of environmental communications. However, the proliferation of dubious and misleading sustainability claims from corporations complicates the promotion of genuine environmental actions and increasingly hinders stakeholders from distinguishing authentic corporate activity from questionable marketing tactics (Ferrón-Vílchez et al., 2020). This lack of clarity can diminish the effectiveness of sustainability communication—consumers bombarded with questionable assertions are likely to become desensitised to or indifferent about environmental issues (Torelli et al., 2019). Consumer reactions to greenwashing are shaped by psychological processes. According to cognitive dissonance theory, when consumers encounter information that contradicts their established beliefs about a company's environmental practices, they feel psychological discomfort that leads them to either revise their beliefs about the company or rationalise their purchasing decision (ibiden). An additional defensive response to misleading marketing strategies is the rise of green scepticism, where consumers critically evaluate corporate environmental claims (Urbański & Haque, 2020). This scepticism is heightened by negative experiences consumers have had with greenwashed products, resulting in a vicious cycle in which distrust poses challenges for companies that are genuinely sustainable at heart.

Due to the increasingly urgent calls regarding environmental issues, transparent and breathable environmental media is necessary. With the rising climate crisis and ecological degradation, companies face increased pressure to address these problems (Aparna, 2024). Guided by transparency and accountability, effective sustainability communication is essential to restore consumer confidence and create impactful engagement with environmental initiatives. This growing awareness of greenwashing underscores the pressing need for a robust regulatory framework and industry standards to ensure that corporate sustainability claims are genuine, thereby creating market confidence (Ma, 2024).

2. The Challenge of Sustainable Communication

Effectively communicating sustainability in environmental discussions is a complex challenge. The information itself is often complex, there is an overwhelming amount of it, and many remain skeptical about corporate sustainability claims. All of this affects how well environmental messages land and whether people actually pay attention. To effectively deliver sustainability messaging, it has to be clear, relatable, and trustworthy. Communication through the noise to create real engagement means that people can understand and relate to it. One of the major challenges involves the complexity of the data itself in sustainability. Scientific reports often include technical terms that may not be understood by the average man, making them hard to understand. This could further lead to confusion or scepticism. Han et al. (2017) raise the issue of more lucid and accessible communication of sustainability, especially in those industries like sustainable fashion, where consumer awareness greatly differs and forms the basis for buying decisions. There is no single way of communicating sustainability that fits all.

Research into digital communication (Saker, 2024) illustrates that the message is more effective if it is adapted to specific audiences. By using targeted, audience-focused strategies, organizations can communicate about sustainability more clearly and foster deeper engagement. In fact, Han et al. (2017) note the need for clearer, more accessible messaging, particularly in industries such as sustainable fashion, where awareness among consumers can vary widely and affect purchasing decisions. Tailoring sustainability messages promotes better comprehension and more active participation. Adding to the complexity in discussing sustainability, there is information overload: the constant bombardment of people in digital platforms over sustainability topics, as one cannot help but become overwhelmed, mentally fatigued, and even disengaged. Misra and Stokols (2011) examine how incessant digital distractions and fragmented information contribute to cognitive overload, hindering people's ability to absorb and respond to vital sustainability messages. Similarly, Chen and Wei (2019) emphasise a curvilinear relationship between social media use and information processing—while digital platforms facilitate the spread of sustainability content, excessive exposure can, in fact, diminish attention and engagement. To avoid these pitfalls, organizations need to focus on clear, concise, and relevant messaging (Sun, 2024). Refining sustainability communication to cut through the noise can prevent information fatigue and keep key environmental issues at the forefront of public attention. Furthermore, one of the biggest hurdles in sustainability communication is public scepticism. People have seen too many companies make big environmental promises only to fall short—or worse, engage in greenwashing by exaggerating their efforts merely for marketing. Over time, this has eroded trust, making transparency more essential than ever. CRG Indonesia, for instance, has worked to rebuild credibility by employing a marketing approach that prioritises honesty and accountability (Kaloka & Zain, 2024). To genuinely connect with stakeholders, businesses require sustainability strategies that are clear, verifiable, and underpinned by real action. Social media has only made this challenge more complex. Whelan et al. (2020) point out that while digital platforms are powerful tools for spreading sustainability awareness, they can also amplify misinformation and public doubt. That's why companies need to take a fact-based, transparent approach—one that reinforces credibility and keeps people engaged in meaningful ways.

Finally, beyond corporate and institutional strategies, community-based conservation offers a powerful way to boost public engagement in sustainability efforts. Ngwenya (2024) highlights the importance of integrating local knowledge and participatory governance, emphasizing that when communities have a direct stake in environmental initiatives, they're more likely to take ownership and drive meaningful change. This bottom-up approach not only strengthens sustainability programs but also helps rebuild public trust by delivering visible, community-led results.

3. The potential role Information design as a tool for transparency

Effective data visualization makes sustainability information clearer and easier to work with. Schneider et al. (2022) point out that in green data mining, good visuals don't just share information—they capture interest and encourage deeper understanding. When complex environmental metrics are translated into clear, intuitive formats, they become more useful—helping people stay informed and make better decisions. Good information design isn't just about looking nice; it's about making data truly meaningful and actionable. Tomsho et al. (2022) emphasise the importance of effective communication

strategies for environmental health data, particularly in addressing issues related to understandability, appropriate levels of concern, and visual clarity. This aligns with the findings of Wästberg et al. (2020), who highlight the necessity for urban planners to employ visualisation tools tailored to specific stakeholder needs, thereby enhancing the communication and application of environmental data. In sum, applying certain visualization strategies helps an organization to bridge the gap between sophisticated environmental data and public comprehension, thereby enhancing community involvement in sustainability initiatives. Effective information design communicates information about sustainability both through physical interactions and digital, developing better stakeholder engagement and fostering informed decision-making. At its core lies the key to data visualization, which turns challenging environmental data into understandable and actionable insights.

This information system design is an interdisciplinary activity for sustainability with theoretical and methodological approaches that include aspects in environment, human-computer interaction, and information systems. Integrating multidisciplinarity, best practice in environment information design can develop in terms of transparency, access, and effective information representation. Theory of sensemaking forms a key part of this field, a key tool for both organisations and individuals in managing complexity in terms of sustainability. As argued by Seidel et al. (2017), not only is sensemaking key in achieving environment sustainability, but it is key in supporting decision-making in a range of organisational and governance environments. Nyström and Mustaquim (2014) go a stage further in supporting such an argument, arguing that information system design for sustainability must involve consideration of HCI in terms of maximising effective use and understandability through application of such principles. Integrating such, information design for the environment can make decision processes more efficient, and in doing so, contribute towards developing objectives for sustainability.

Transparency – far being just a best practice – is a key principle in environmental information system design, supporting trust, accountability, and legitimacy in sustainability programs. Graaf and Squintani (2021) highlight that access to environmental information is a fundamental right, giving people the ability to engage with and influence sustainability decisions. Watson et al. (2012) note that an information strategy that complements engineering interventions through providing relevant and reliable information to stakeholders is a key necessity. Gholami et al. (2016) reiterate this through a demand for information systems that move beyond providing raw information, with a view towards supporting an increased level of understanding regarding sustainability concerns in its users. Data visualization is particularly important in such a scenario, with its potential for effectively and engagingly communicating complex datasets in an environmental context. Environmental data infrastructure is seen, according to Goldstein and Faxon (2020), to have a role in supporting transparency and participatory governance, with an important role for well-designed data structures in countering public scepticism and supporting trust in sustainability programs. Metze's (2020) systematic review reiterates such a position, with a demonstration that such data visualisations have a significant impact in shaping public understandings of environmental issues and, in turn, the perceived legitimacy of intervention through policy interventions. When organizations commit to clear, data-driven transparency, they do more than make promises—they earn trust. This trust strengthens environmental policies and corporate sustainability efforts, ensuring accountability is more than just a trendy phrase.

4. METHODOLOGY

The research adopted a mixed methodological approach, combining qualitative and quantitative analyses to explore both students' perceptions of sustainability and their actual daily environmental impact. The project developed through three distinct but interconnected phases: a preliminary phase dedicated to literature analysis and problem definition, followed by a data collection phase using a detailed questionnaire, and finally an AR Data-Exhibition design phase based on the collected data. The project timeline extended from October 2023 to March 2024, with the data collection phase concentrated in the first two months and the subsequent AR Data-Exhibition design in the following months. This timeline allowed for the construction of an experience based on real, verifiable data, actively counteracting the phenomenon of greenwashing through methodological transparency.

4.1 Data Collection

The present study collected data from a sample of 72 students from [omissis for review], specifically from the Faculty of Architecture. The selection of this particular target group was not arbitrary; students embody the generation that will be confronted with future environmental challenges and possess the capacity to act as agents of societal transformation. The key tool for collecting information in this case was a survey tool titled 'Which Eco has your day?', carefully crafted in an attempt to evaluate students' ecological footprint. With 45 questions, taking about 8-10 minutes to answer, and crafted in a manner that could be completed and not cause frustration, it helped in collecting information in a friendly and engaging manner for respondents. All 45 questions were carefully arranged in a sequence following students' morning and evening routines, and even including leisure times and commuting between university and home, in an organized and sequential manner, providing a thorough and in-depth picture of students' daily routines and impact on the environment.

4.2 Framework Analysis

The analysis of information collected proceeded with a multi-level evaluation model through a combination of quantitative and qualitative analysis. Quantitatively, CO2 emissions generated through a range of daily actions, consumption of water sources, and occurrences of both sustainable and non-sustainable behaviors were considered. Qualitatively, the assessment focused on students' environmental awareness, their ability to perceive the consequences of their actions, and their willingness to change behavior. Engagement levels were also evaluated by observing participation in activities and analyzing qualitative feedback collected during interactive sessions. This comprehensive approach provided a deeper understanding of behaviors, motivations, and barriers to change.

4.3 Design Process

This design process was developed in a series of iterative steps, starting with the in-depth analysis that outlined significant behavioral patterns from data collected. These insights guided the development of data visualizations and the design of the interactive

installations. Each element of the AR Data-Exhibition was designed to maximise transparency in the presentation of data and to encourage active visitor engagement. The design choices were guided by the need to create an experience that not only communicated sustainability information, but actively engaged sample in a process of discovery and critical reflection. The utilisation of verifiable data and reliable sources, in conjunction with clear visualisations of cause-effect relationships, facilitated the construction of an authentic and transparent narrative, in stark contrast to greenwashing practices. This methodological approach established the foundations for an AR Data-Exhibition that transcends the mere communication of environmental information, thereby creating a space for dialogue and critical reflection on the impact of our daily actions. The result is an experience that not only raises awareness but also stimulates behavioural change through deep understanding and active engagement.

5. Unsustainable Sustainably: a data-driven journey

The performance-data concept arises from a profound contradiction in speaking about the environment: actions and awareness for cutting down emissions have multiplied, but a definite lessening in overall impact continues to escape them. *$FaCO_2$ Conti (I do the maths)*, a pun title, conveys a definite calculation of emissions and a general consideration of everyday options. This double meaning underscores the necessity of working with empirical data to counteract the shallow language often associated with greenwashing.

5.1 Concept Development

The site for hosting the data exhibition was a deliberate choice aimed at maximizing its impact. Being a site regularly frequented by hundreds of students, the atrium serves as an ideal location to maximize the exhibition's visibility and engagement. Universities are not just academic institutions but also forums for discussion and critical thinking, making them particularly well-suited for raising awareness about environmental issues.
The target audience for the data exhibit is university students, selected based on two key factors. First, their accessibility ensures easier engagement. Second, as a group most susceptible to the direct impacts of climate change, students have significant potential to drive social change. Their active participation in sustainability discussions is crucial for fostering meaningful environmental progress.

5.2 Anti-greenwashing strategies

$FaCO_2$ Conti employs meticulous design methodologies to combat greenwashing, prioritising transparency and verifiability of data within the AR Data-Exhibit experience. These methodologies are implemented across various domains, ranging from the selection of data to its presentation and the material selections of AR Data-Exhibit design. The primary strategy emphasises transparency in data presentation, with each display being accompanied by explicit indications of the underlying sources and calculation methodologies. The data is sourced from verifiable entities such as Our World in Data, the

Green Italy report of 2023, and specific studies on energy consumption, enabling sample to verify the information presented independently and to establish a foundation of trust based on direct observation rather than passive acceptance. The utilisation of an analogue-interactive approach constitutes a pivotal strategy in addressing the abstract nature prevalent in environmental communication. By physically materialising data, sample can personally experience the impact of their daily actions. In the 'Life in Plastic' section, for instance, sample have the opportunity to make a direct contribution to the monitoring of plastic waste by depositing their waste in a container that displays the accumulation in real time. This direct experience stands in contrast to the typical vague statements about recycling, thereby rendering the individual impact tangible and measurable. The coherence between message and means is reflected in the material choices of the AR Data-Exhibit. The use of plywood recovered from production waste, treated with fireproof varnish, and the use of recycled PETG for the 3D printing of the AR Data-Exhibit objects concretely demonstrate the possibility of making sustainable choices, in contrast to the greenwashing typical of many environmental communications that preach sustainability but use high-impact materials.

The AR Data-Exhibit's narrative structure is meticulously designed to unveil the incongruity between perception and reality, commencing with seemingly innocuous everyday actions such as breakfast or the home-college commute, and progressively exposing the cumulative impact of these behaviours. This approach eschews the accusatory tone frequently seen in environmental communication, favouring a gradual and reflective awareness. A pivotal element of the anti-greenwashing strategy is the direct comparison between perceptions and actual data. At the commencement and conclusion of the tour, sample are invited to evaluate their lifestyle in terms of sustainability. This juxtaposition of self-perception and objective data unveils the disparities between our beliefs and the tangible impact of our actions, thereby facilitating a more nuanced and informed understanding of environmental issues. The interactive installations have been designed to produce verifiable results in real time. For instance, in the transport section, sample can map their journeys and immediately see the CO2 impact, based on verifiable emission data per kilometre. This immediacy of verification contrasts with the typical vague statements about reducing emissions. The communication uses clear and direct language, avoiding vague or misleading terms typical of greenwashing. Units of measurement are always specified and contextualised, rendering even the most complex data understandable. This linguistic clarity is further enhanced by the graphics and visualisations, where every element is designed to maximise comprehensibility. Data is always temporally contextualised, showing the evolution of impacts over time, in contrast to the tendency of greenwashing to present data in isolation or without temporal context. This approach allows a deeper understanding of trends and changes over time. The AR Data-Exhibit is notable for its dual function as both a platform for highlighting environmental issues and a source of concrete, verifiable alternatives. Each section of the AR Data-Exhibit includes practical suggestions for reducing environmental impact, with these suggestions being based on verifiable data and achievable actions. This action-oriented approach is a marked contrast to the vague promises of sustainability typical of greenwashing. The integrated and coherent strategies of the AR Data-Exhibit create a communication system that not only counteracts greenwashing but actively builds a new form of environmental communication based on transparency, verifiability and direct involvement. The effectiveness of this approach is manifest in the AR Data-Exhibit's ability to stimulate critical reflection and conscious behavioural change in sample.

5.3 Design Choices, Visual Language and Data Materialization

The AR Data-Exhibit is divided into five sections, each characterised by a distinctive visual language that translates abstract data into tangible experiences. Each section uses a specific colour palette that not only helps with orientation but also communicates precise concepts through colour.

'At breakfast: milk and emissions' uses shades of blue and green that evoke an artificial, contaminated nature, and the plate metaphor is realised through 3D printed objects of different sizes combined with radar graphics, materialising the emissions associated with different food combinations. This approach establishes an immediate connection between the everyday object and its environmental impact.

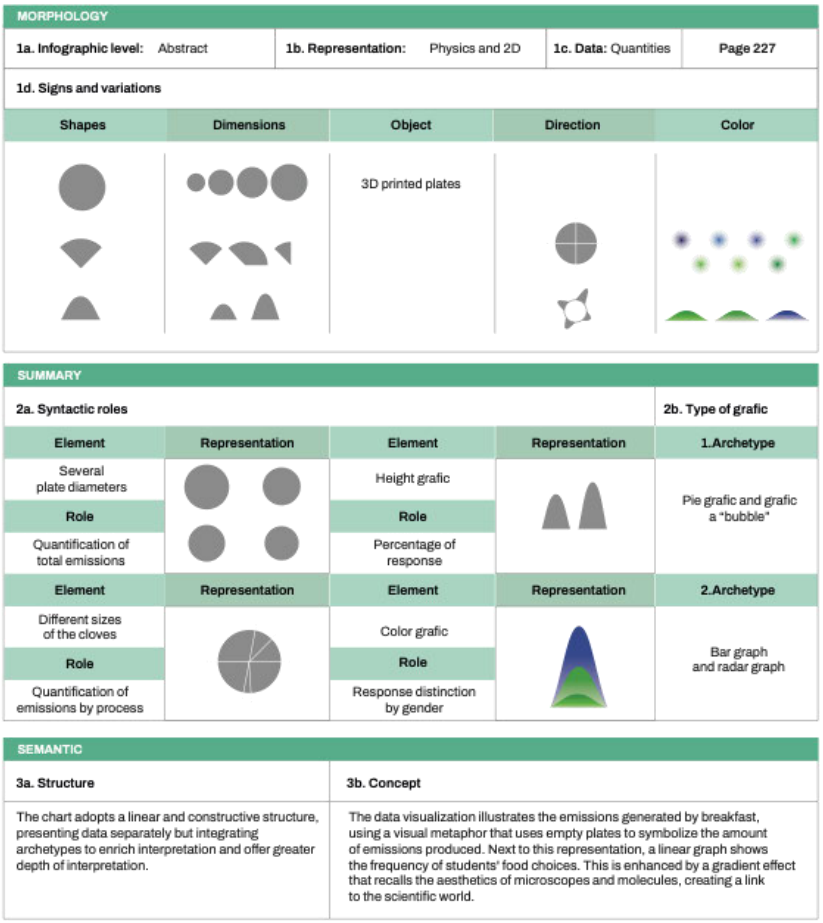

Figure 1. Visual Structure Analysis of the Infographic Components

'Data in Appeal' is developed in three subsections characterised by purple and orange tones, which create a visual tension between artificiality and nature. 'Hefty Commute' transforms mobility data into a three-dimensional map through the use of pins and wires; 'A sip of pollution' visualises coffee emissions through graduated containers that gradually fill up; and 'Life in plastic' makes the accumulation of waste tangible through a container that visually grows with sample' contributions.

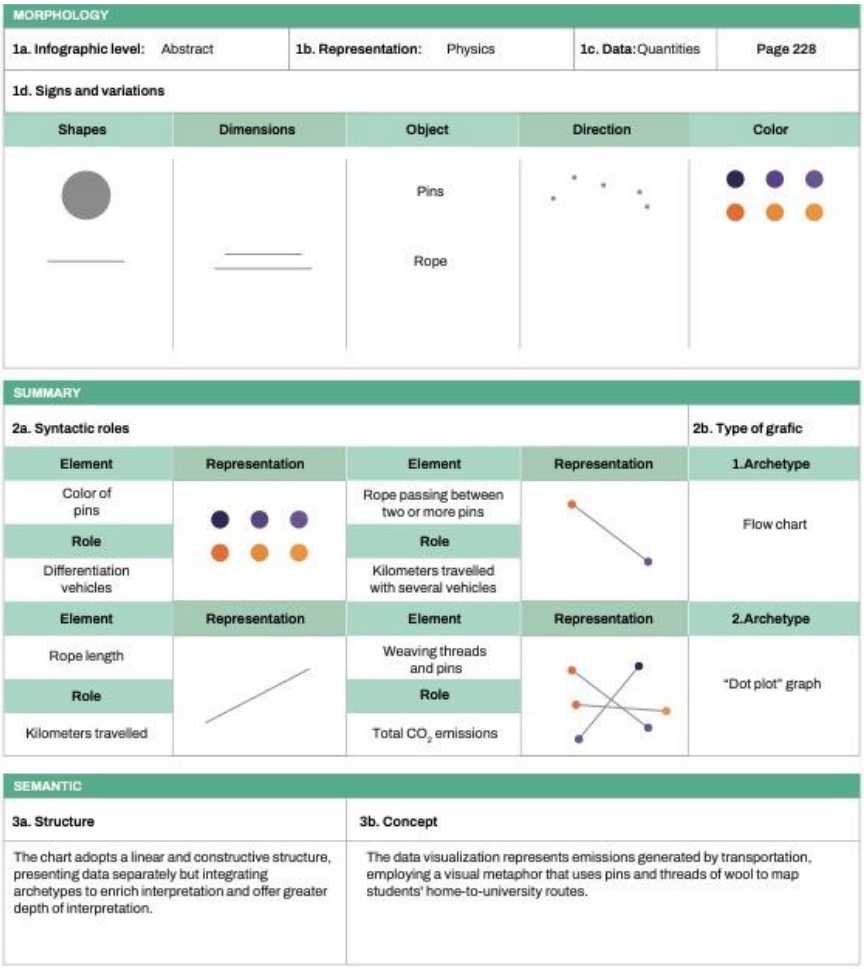

Figure 2. Visual Structure Analysis of the Infographic Components

The section entitled Polluttion&Chill and 'Statistics Under the Carpet' utilise colour theory to symbolise the artificial nature of digital emissions, employing magenta and yellow to represent the concept of 'sofa pollution' and 'statistics under the carpet', respectively. The incorporation of hazy, blurred shapes in these visualisations serves to create a visual bridge between the tangible and intangible aspects of digital pollution, thereby illustrating the concept of 'sofa pollution' and 'statistics under the carpet'. 'Statistics Under the Carpet' combines blue and orange to represent the contrast between natural resources and human consumption and utilises gradually blending shades to suggest the possibility of a synergy between human action and resource preservation.

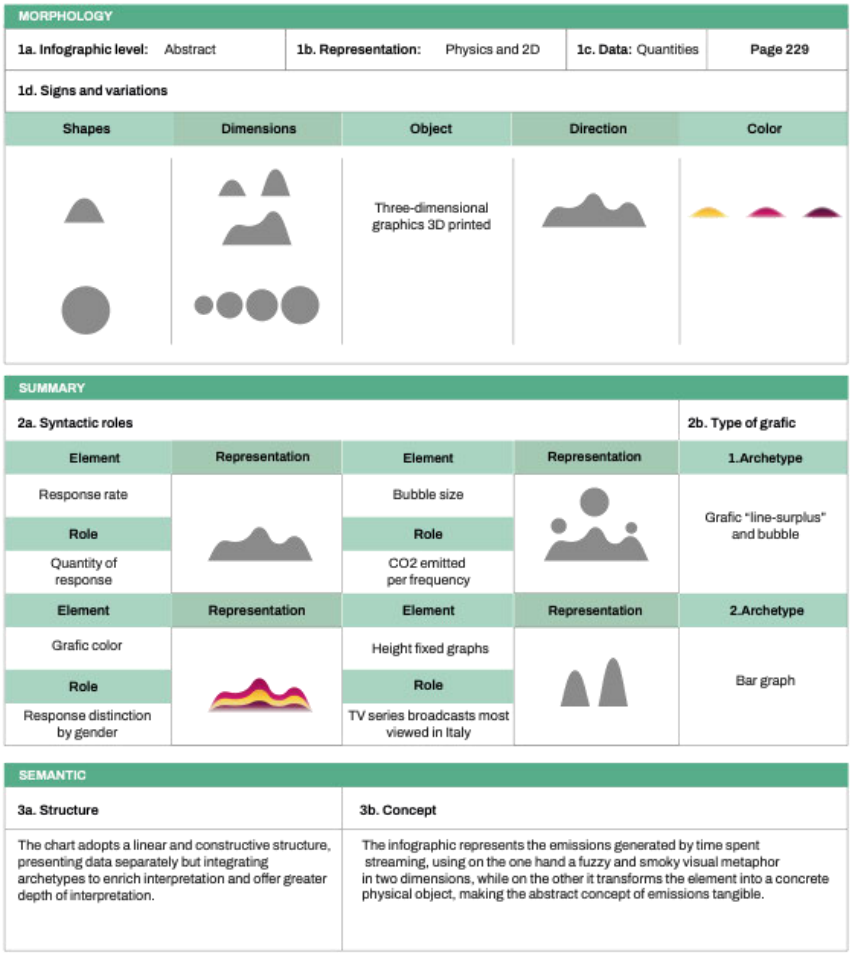

Figure 3. Visual Structure Analysis of the Infographic Components

The visual language employed in the AR Data-Exhibit has been developed with the objective of translating abstract emission data into tangible and comprehensible experiences. Each visual element was meticulously designed to overcome the cognitive barriers frequently encountered in environmental communication, where the invisibility of impact often impedes comprehension and subsequent action. The materialisation of data is manifested through different visual archetypes developed for each section. In the breakfast section, the conventional pie chart is rendered in physical plates of varying dimensions, thereby establishing an immediate association between the quotidian object and its environmental impact. The dimensions of these plates correspond precisely to the quantities of CO2 emitted, thereby facilitating immediate visual comparisons between different food choices. The integration of these visual elements is meticulously designed to facilitate immediate comprehension of the relationships between everyday actions and their environmental impact. The consistent use of familiar visual archetypes (plates, bowls, containers) facilitates immediate connections with sample' own experiences, while more abstract graphic representations support the understanding of quantitative data. In the consumption sections, the utilisation of transparent containers, which are progressively filled with balls for coffee or real waste for plastic, engenders a dynamic visualisation that evolves in tandem with the contributions of sample. This approach not only renders the accumulation process perceptible but also transforms sample into active participants in the visualisation process. The colour palettes employed in each section have been meticulously curated to convey specific messages. The teal and green tones of the breakfast section evoke a controlled artificiality, whilst the purple and orange

of the university section create tension between nature and artifice. Magenta and yellow in the digital section symbolise the hidden impact of technology, and finally, the blue and orange of the domestic section represent the contrast between natural resources and consumption. The employment of colour nuances and the gradual transitions between colours allude to the potential for transformation and change, thereby circumventing a binary depiction of the environmental issue. These colour selections are underpinned by a theoretical framework that explores the psychological implications of colours and their influence on the interpretation of information. A particular emphasis has been placed on the representation of imperceptible information, such as digital emissions or energy consumption. The employment of hazy, shaded shapes in two-dimensional graphics serves to establish a visual connection between the tangible and the intangible, thereby rendering the invisible visible. This graphic choice assists sample in visualising the hidden impact of their everyday actions, thereby overcoming the 'invisibility' issue that is characteristic of environmental communication. The consistency of the visual language across all sections of the AR Data-Exhibit establishes a reference system that sample gradually learn to interpret. The progression through the AR Data-Exhibit is characterised by the incremental integration of novel elements that are grounded in the established visual conventions of preceding sections, thereby facilitating the comprehension of increasingly intricate data in subsequent areas.

5.4 AR Data Exhibition Layout

The AR Data-Exhibit layout has been meticulously designed to follow a precise information hierarchy, thereby guiding sample through a logical progression of discoveries. The predominantly horizontal arrangement of AR Data-Exhibit elements, realised through the use of counters, ensures unobstructed views through the expansive atrium windows, thereby creating an open and accessible experience. The information structure is developed on three distinct but interconnected levels:

- A first level of immediate, visual data that captures attention through three-dimensional objects and dynamic visualisations
- A second level of contextual information that explains the meaning of the data through explanatory panels and in-depth graphics
- A third level of detail that the information structure is developed on three distinct but interconnected levels.

Firstly, there is a level of immediate, visual data that captures attention through three-dimensional objects and dynamic visualisations. Secondly, a second level of contextual information is provided, explaining the meaning of the data through explanatory panels and in-depth graphics. Thirdly, a third level of detail allows sample to further explore the themes through references to complementary sources and data.
The AR Data-Exhibit counters have been designed in two different heights (to optimise the ergonomics of interaction and create a rhythm in the fruition of content. This variation of heights also supports the information hierarchy, visually distinguishing active interaction areas from observation areas. The display system utilises vertical elements, including banners suspended by nylon ropes, which contribute to the visual lightness of the space and function as markers for the various thematic sections. Stainless steel rods are employed to suspend stickers and interactive media, creating additional points of engagement distributed along the route. The AR Data-Exhibit route evolves in a natural and intuitive manner, commencing with familiar everyday actions such as breakfast and progressing to less obvious yet equally impactful behaviours such as using social media or streaming video. This progression enables sample to progressively construct their

comprehension, correlating each new piece of information with previously acquired knowledge.

5.5 Preliminary Finding

What comes out of this study is that routine actions have an impact that doesn't register in our consciousness. Greenwash deflects concern towards environmentally friendly production, but real consumption repercussions fall through the cracks. Step back, and, in a big picture, statistics paint a picture of deep and systemic unsustainability.
Coffee consumption demonstrates the carbon footprint of daily habits, with bar-served coffee emitting 0.02 kg CO_2 per cup and vending machine coffee 0.01 kg CO_2. Despite higher power usage, vending machines consume energy more efficiently. With 40% of students drinking over three coffees daily, the total sample impact reaches 0.7 kg CO_2 per day. Disposable cups from vending machines further contribute to plastic waste, aligning with ISPRA's findings on catering-related pollution [Figure 4] [Figure 5].

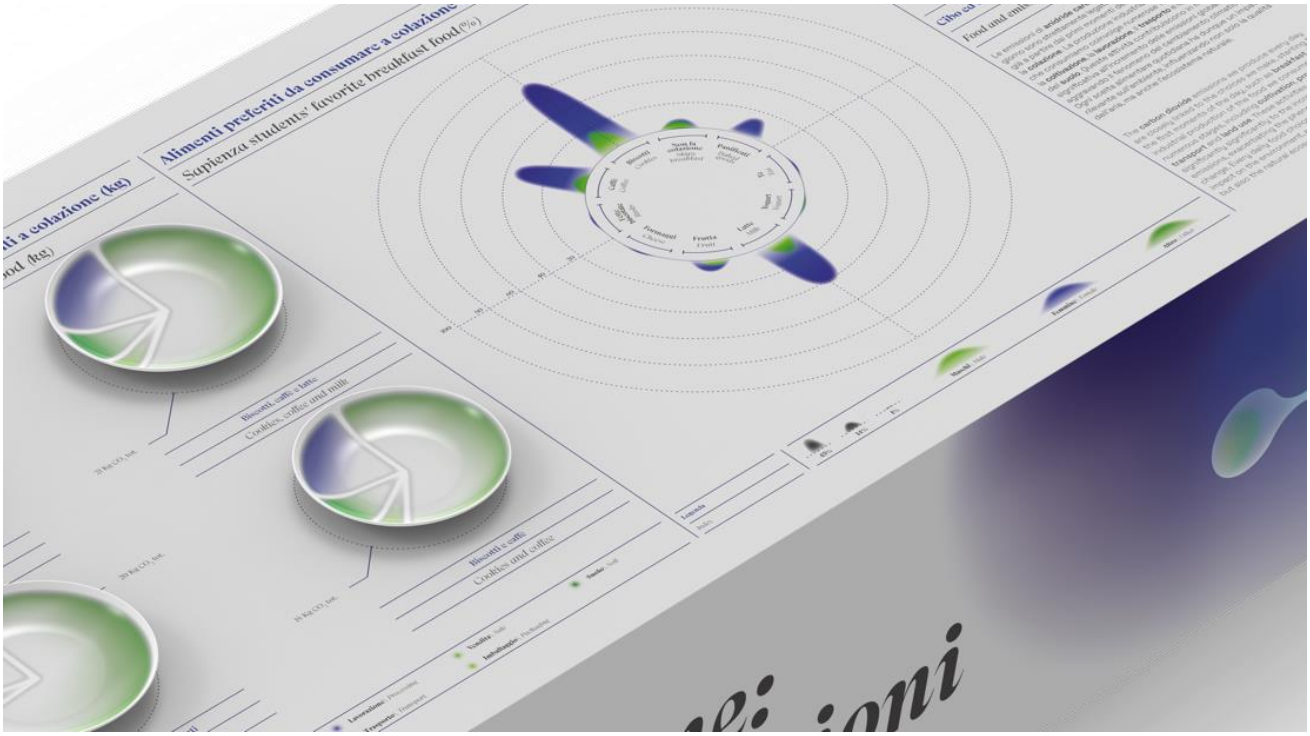

Figure 4. Breakfast – Data Exhibit

Figure 5. Coffee Consumption – Data Exhibit

Urban mobility visualizes the emissions associated with student commutes, exposing the contradictions of seemingly sustainable choices. Conventional cars produce 0.84 kg CO_2 per 5 km, while public transport, electric cars, and active mobility show a decreasing gradient of impact. The cumulative emissions for the student sample reach 103 kg CO_2. A life cycle analysis underscores the hidden footprint of electric vehicles, including production emissions and energy sourcing [Figure 6]

Figure 6. Urban Mobility – Data Exhibit

Single-use consumption of plastics reveals a concealed paradox in sustainable thinking.

Real-time observation reveals a single 500 ml plastic bottle releases 0.1 kg CO_2 in its production. With 60% of students using single-use bottles a day, its contribution overall is significant. All these statistics validate ISPRA estimates, with a spotlight thrown over emissions in production, transportation, and disposal, veiled in most cases with stories of recyclability.

Figure 7. Plastic Waste – Data Exhibit

Social consumption through social media reveals a symptomatic case of invisible virtual pollution. The 'Atmo-scrolling' visualization quantifies the carbon footprint of online activities, showing that one hour of social media emits 0.16 kg CO_2, with prolonged use increasing the impact exponentially. Given that 72% of students spend over two hours daily on social platforms, their total impact reaches 26 kg CO_2. Data centers powering social media contribute 1–2% of global emissions, a rarely perceived but significant environmental cost. Linked to this, streaming content consumption is another underestimated source of emissions [Figure 8].

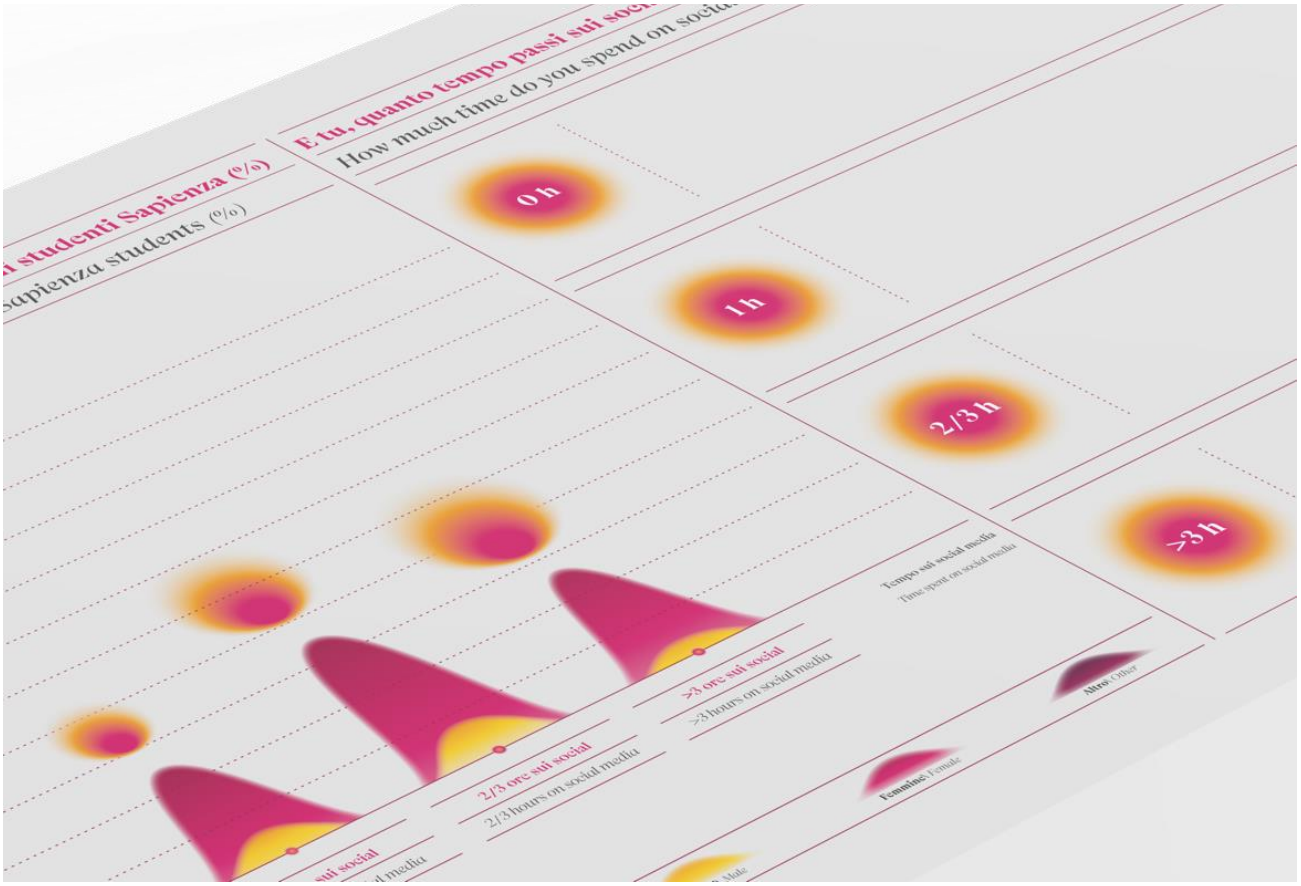

Figure 8. Social Media Pollution Impact – Data Exhibit

The 'Pollution&Chill' infographic illustrates that one hour of streaming produces 0.45 kg CO_2, with daily habits among students contributing a cumulative 52 kg CO_2. Streaming services, often perceived as low-impact, account for 1% of global emissions—comparable to the aviation industry. The visualization materializes this impact through 3D representations of emissions from popular TV series [Figure 9].

Figure 9. Streaming impact – Data Exhibit

Fashion consumption is examined through 'Clothes&Co,' revealing the environmental burden of frequent purchases. Buying clothes 2-3 times a month results in 120 kg CO_2 per individual, with the sample's total impact reaching 95 kg CO_2. Fast fashion, responsible for 0.4% of global emissions, exemplifies the distortion of sustainability through greenwashing. A participatory visualization using pins on a T-shirt makes this cumulative impact tangible [Figure 10].

Figure 10. Clothes impact – Data Exhibit

Water consumption is visualized in 'Spilled Gold,' showing how routine activities contribute to resource depletion. A 10-minute shower uses 270 liters of water, while standard laundry cycles consume 48 liters per wash. With 58.3% of students taking long showers multiple times a week, the research underscores the hidden wastefulness of domestic water use, supporting findings on urban water inefficiency. Food delivery exemplifies the misleading sustainability of convenience. The 'Carbon to Go' infographic breaks down emissions from packaging, online transactions, ingredients, and transport, revealing that even a single pizza delivery generates notable carbon output. Frequent use among students results in a cumulative impact of 0.2 kg CO_2 per order, with disposable packaging adding to municipal waste [Figure 11].

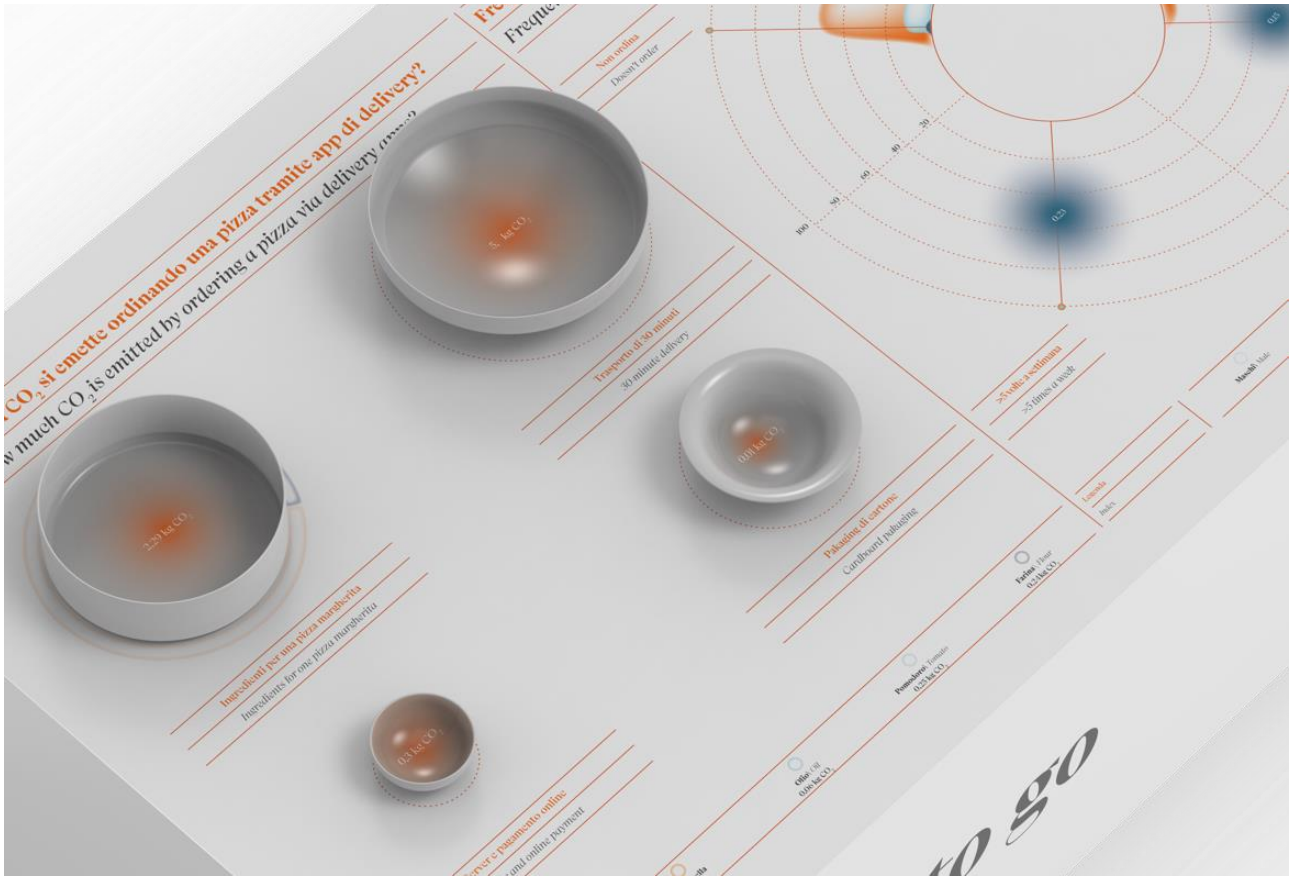

Figure 12. Delivery impact – Data Exhibit

But, even dietary choices emerge as a major factor in systemic unsustainability. The 'Raw Data' visualization contrasts the emissions of different diets: omnivorous (7.35 kg CO_2/day), vegetarian (3.35 kg CO_2/day), vegan (2.17 kg CO_2/day), and flexitarian (4.24 kg CO_2/day) [Figure 13].

Figure 13. Dietary choices impact – Data Exhibit

A review of meat production between 1961 and 2022 reveals its exponential rise, with Asia producing 155 million tonnes in 2022 alone. Besides, intensive rearing of animals releases ammonia, with 11,600 tonnes in one region, specifically Lombardy, alone in a single year.

6. Data Discussion: visualization, physicalization and impact

The study's findings present an effectiveness in embodying information about the environment in an installation in overcoming awareness obstacles regarding sustainability. The materialization approach performed consistently in all nine installations, with each one employing a range of representational strategies in a concrete form in representing invisible consequences in a concrete form. Effectiveness manifested in three forms: transforming invisible information into a concrete form, visualization of aggregated consequences, and revealing paradoxes in perception regarding sustainability. Physical information embodiment through hands-on manipulation became a powerful tool for communicating about the environment.
In the "Life in Plastic" installation, the physical accumulation of waste created an immediate and memorable visual impact, with 85% of sample reporting heightened awareness despite prior environmental knowledge.

Figure 14. Plastic bottle Data Exhibit

This supports Xiao et al.'s (2021) findings on tangible visualization's role in overcoming "moral decoupling." Similarly, the "Hefty Commute" installation's pin-and-wire mapping system effectively materialized emissions through collective route visualization, leading 65% of sample to reassess their transport impact perceptions (Wang & Walker, 2023).

Visualization strategies proved particularly effective in revealing hidden environmental impacts across different consumption domains. The "Atmo-scrolling" installation's use of blurred and hazy shapes created a visual bridge between digital actions and physical impact, addressing what Wedari et al. (2021) term the 'perception gap' in understanding intangible impacts. The "Pollution&Chill" installation's three-dimensional representation of streaming emissions similarly made visible the hidden environmental costs of digital

consumption, with 85% of sample expressing surprise at the impact's magnitude. The materialization approach was particularly successful in exposing contradictions between perceived and actual sustainability. In coffee consumption, 65% of students chose vending machines believing them more sustainable, overlooking waste generation impacts. This aligns with Sdrolia & Zarotiadis's (2018) findings on sustainability perception complexity. Similarly, in urban mobility, 45% of electric car users considered their choice completely sustainable, demonstrating how focused messaging can mask lifecycle impacts.

The research uncovered effectiveness in various techniques of materialization in consumption spheres. "Spilled Gold" installation's use of gradated containers made consumption of water concrete, with 90% of sample having never measured consumption in such a manner beforehand. "Clothes&Co" installation's accumulative T-shirt with pins effectively represented fast fashion's aggregated impact, corroborating Vries et al.'s (2013) work regarding materialization and its contribution to behavior change. Digital consumption posed a particularly challenging consumption sphere for awareness about the environment, with virtual impact materialization proving key to raising awareness about it. "Atmo-scrolling" installation's sticker visualization showed 90% of sample having never taken into consideration digital impact, and 75% having been surprised at seeing such a high level of emissions. That result corroborated current studies regarding perception of digital impact, and it showed how seeming immateriality is a cause for impact underestimation.

Analogy with an analog, interactive character consistently showed effectiveness in closing gaps between awareness and behavior in relation to the environment. By providing a hands-on, concrete form and a visualization, installations translated virtual, abiotic environment information into concrete experiences, supporting critical thinking about daily actions. Nevertheless, persistent gaps between perceived and real sustainability, and most notably in seemingly "green" options, reveal ongoing difficulty in overcoming greenwashing and the necessity for systemic approaches toward educating for sustainability.

That conclusion proposes effective environmental communication not only in presenting but in transforming data into interactive, concrete experiences. Effectiveness in a variety of techniques of materialization and visualization in a range of consumption spheres brings important insights for future environmental communications strategies, but at the same time, the study reveals the necessity for ongoing development in making the invisible impact of the environment apparent and overcoming complex interdependencies between perception and reality in awareness for sustainability.

Conclusion

The work opens a range of avenues for future investigation with significant development potential. First, long-term studies can investigate long-term behavior change through extended duration of embodied information about environments. Second, transposing practice for use in new environments, such as workplace settings and public spaces, can seek to generalize its effectiveness in a variety of environments. Third, real-time information feeds and IoT sensors could, together, allow for real-time installations that respond to real consumption behavior. Though in proving effectiveness in communicating with the environment through visualization and materialization, several limitations must be taken into consideration. That university students in a single faculty have been targeted in the study may not necessarily generalize a larger population

response towards visualization of environmental information. That a short-term basis for such a study is conducted is a cause for concern in terms of long-term behavior and attitude change.

In the future, such a path for conveying environmental information through visualization and materialization can become even more beneficial in working with new emerging environmental concerns. That success in discovering hidden environmental effects can have future application in new emerging industries such as mining for cryptocurrencies, cloud computation, and artificial intelligence and its environmental impact. All these can bridge the growing divide between technological development and awareness regarding the environment. The study identifies a critical imperative: developing communications that not only reveal environmental impact but that can have a sustained momentum over a period of time. There is an imperative for future inquiry into sustaining the impact of materialization through ongoing dialogue and feedback processes, potentially through a blending of virtual platforms and real-life installations to generate enduring awareness of environmental impact.

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DESIGN, SUSTAINABILITY REPORTING AND DATA-DRIVEN DASHBOARDS.

Communicating data as a strategic leadership tool through design

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ABSTRACT | As companies come under greater pressure to show that they are serious about ESG principles, being able to present clear, accessible, and engaging data on sustainability has become increasingly important, thus providing stakeholders with the data they need to evaluate corporate responsibility and sustainability practices. These reports are a factor affecting a company's access to finance, as investors and other stakeholders are increasingly making decisions based on sustainability; they enhance comprehension and retention of complex sustainability data, making information more accessible to a wide audience. It amplifies such benefits by giving a more active and dynamic insights view in real time on the dashboards' ability to permit access and interaction of stakeholders dynamically with sustainability data included within complex data sets and transforming it into very easy, nice-to-consume forms. This enhances the engagement of a user not only in understanding it better but also in creating opportunities to make more accurate decisions with in-depth analytics of data. Furthermore, impressive use of visual variables in a sustainability report not only enhances aesthetic appeal but also serves as a commanding tool in the management of impressions. By deploying enhanced visualization techniques, a firm communicates powerful narratives related to its core sustainability initiatives in shaping stakeholder perceptions and leveraging brand reputation. All these reports, however, inherently have varying levels of effectiveness, and at this juncture comes clarity-the art of communicating complicated data in a manner that can be understood-where data storytelling techniques play a crucial role. This is a practice to be undertaken with care. Ensuring the visual representations match the actual performance in sustainability will help avoid 'greenwashing', whereby organisations may seem to be exaggerating their

efforts in sustainability. Appreciating this precedent, the paper explores how the dual roles of sustainability reporting and data visualization designs support a brand in being more responsible through better stakeholder comprehension and trust.
Examples will be provided by the analysis of case studies with leading energy companies, such as Enel and Eni, on how firms are facing up to the challenges relating to transparency and accountability through the use of data visualization. They discover how design has become a major leading strategy for modern organizations in pursuit of better articulation of their commitment to sustainability, preparing stakeholders to make informed decisions with data as the backbone, and giving form to the complexities of today's sustainability landscape with design.

KEYWORDS | INFORMATION VISUALIZATION; DATA-DRIVEN DASHBOARDS; SUSTAINABILITY REPORTING; DATA-DECISION MAKING

1. Introduction

In the context of Big Data and increased scrutiny over corporate responsibility, sustainability reporting has come to mean much more than a list of environmental and social metrics. Digital platforms represent today the tool on which judgments about organizational commitment to ESG are based by all kinds of stakeholders, from investors and policy-makers to NGOs and the general public. The volume, complexity, and real-time nature of ESG data can either illuminate or obscure genuine progress, depending on how effectively information is gathered, interpreted, and presented. The challenge for companies is to leverage interactive dashboards, UX design, and thoughtful information architecture in order to engender public trust, engage visitors in substantive analysis, and reduce the risk of "greenwashing" (Gelmini, 2017; Šimunović, 2024). Eni and Enel, two leading energy corporations based in Italy, provide illuminating case studies of how design-driven dashboards can shape or reshape public discourse around sustainability. Both companies operate in a sector that is central to global climate challenges, and both have declared significant commitments to greener operations, yet they must consistently demonstrate verifiable progress to maintain credibility (García-Sánchez et al., 2019). They have risen to this challenge by building online platforms-"Eni for" and "Beyond Reporting"-aimed at making ESG metrics more engaging and interactive. While both platforms pursue similar goals, they differ dramatically in design philosophy, data visualization style, narrative choices, and levels of methodological disclosure.
This paper discusses how information design, interaction design, user engagement strategies, and team structures come together in shaping user perceptions of Eni and Enel's sustainability initiatives. Drawing on observational data, analysis of published materials, and interviews with designers, product managers, and sustainability professionals, this research places the dashboards within a broader theoretical context that deals with trust-building, impression management, and ethical design choices. These comparative insights lead to a proposed design framework that considers best practices, which can be applied across industries in the pursuit of clarity and credibility for digital sustainability reporting. This paper seeks to outline a more holistic approach to designing sustainability dashboards with deeper reflections on interface architecture, user agency, brand narratives, and cultural norms in an effort to create robust, transparent, and engaging communications.

2. Theoretical Framework

2.1 Information Design and the Construction of Credibility in Digital Media

If anything, information design conventionally underlined the use of clarity, conciseness, and coherence principles in visually presenting complex data. Within digital media, these core principles converge with elements of perceived credibility and user trust. Typographic consistency, informed colour decisions, and harmony in layouts create an aura of credibility in work related to visual cognition and human-computer interaction well before a user will start digging deeply for data evidence to support the contention. Conversely, design inconsistencies (e.g., misaligned labels, crowded charts, and a lack of consistent colour) may inadvertently sow doubts about the truthfulness of the information depicted (Tong 2023). While in sustainability contexts, organizational dashboards embed not only numerical figures but also narratives around corporate values, long-term strategies, and accountability structures. For data to inform public discourse, it has to be both accurate and meaningfully framed. Information design thus becomes the vector for weaving these contextual layers around quantitative metrics, connecting sustainability performance to broader social, economic, and ethical concerns. This process rhymes with what Tufte insisted upon-the "quality, relevance, and integrity of the content" (Tufte, 2001)-as data integrity. An organization's capability to engender trust, therefore, partially relies on the congruence of its design decisions with verifiable substance in its sustainability claims.

In respect to information design for trust-building, especially around data visualization, a set of factors encourages perceived credibility within the audience (Smith et al., 2022). Colour schemes, typography, and layout significantly shape users' willingness to trust the information they encounter (Jones et al., 2021). Visual aesthetics can enhance perceived data quality, as users often associate cohesive, well-structured visuals with higher informational integrity (Brown et al., 2023). Consistent design patterns and familiar metaphors encourage more intuitive navigation of complex datasets, fostering a greater sense of reliability (Lemon et al., 2020). Similarly, whitespace and clear hierarchies play the role of reducing clutter and making visual narratives more digestible Marques et al. (2021). Even further, the presence of transparency and accessibility enhances the level of trust in visualizations. Users are likely to find data credible when access to metadata, methodological notes, and clear source citations can be made. Data-driven dashboards represent a paradigm shift from static PDF reports by enabling real-time or near-real-time data updates, interactive exploration, and dynamic visualization (Satpathy & Gavaskar, 2022). The significance of engagement in these systems extends well beyond initial user clicks. Trust is closely linked to user experience (UX) as well. Whereas a very intuitive, pretty platform inspires confidence, one with a befuddling interface undermines confidence-even when the information in it may be accurate. Santoso & Schrepp, 2019; Tong, 2023. Equally, in presentation, the designers have to balance sophistication, simplicity, and emotional resonance if they want their users to both feel informed and welcome. Kusuma et al., 2022. The principle of "progressive disclosure" constitutes one helpful guide in this respect. While broad coverage of sustainability metrics is highly desirable, very dense visualizations impede insight into the key facts that are being communicated (Ryu & Kim, 2019). Gradual exposure to deeper layers of data allows users to explore at their own pace, enhancing user engagement and user trust (Buono et al., 2020). Interactive elements in visualizations that allow user-driven inquiry further magnify understanding in a self-reinforcing circle between clarity of design and credibility of presentation (GONÇALVES, 2023).

2.2 Data-Driven Dashboards, User Engagement, and Attention

Management

Data-driven dashboards represent a paradigm shift from static PDF reports by allowing real-time or near-real-time data updates, interactive exploration, and dynamic visualization. According to Satpathy & Gavaskar (2022), the importance of engagement in these systems goes far beyond the first clicks that users make. It includes the depth and duration of user immersion, how thoroughly users comprehend the data, and whether they feel motivated to investigate more or share insights (O'Brien & Toms, 2008). In dashboards with accessible explanations, dynamic filtering, or scenario simulations, for example, users might develop a deeper sense of agency, leading to better insight into the base metrics (Blascheck et al., 2019). However, it is critical to be sensitive about the interaction between engagement and attention management. The use of gamification or other persuasive strategies in design can take advantage of cognitive biases and thus increase user interactions, potentially overshadowing critical discourse (Sakir, 2024). Genuine empowerment differs from superficial attention capture. A dashboard supporting critical thinking displays contradictory data against positive trends, enables comparisons, and points to less favourable metrics when necessary. According to Meqdadi et al. (2020), authenticity in the presentation of data on sustainability therefore is inseparable from the general aesthetic appeal of the entire platform. While dashboards present nice visuals, if they do not encourage critical engagement with the data, there is a risk that they may actually promote passive consumption of information rather than meaningful learning and action.

User engagement in sustainability communication is a multifaceted challenge and can be approached through strategic interaction design. Gamification, for instance, is one such element that has proved to motivate more active involvement in making sustainability goals enjoyable and rewarding according to Arceiz et al., 2022. Incorporating storytelling techniques, including narratives or case studies, makes issues more relatable and captures user attention (Ji & Darnall, 2020; Meqdadi et al., 2020). Providing immediate feedback to users about their actions—such as showing real-time energy consumption—reinforces positive behaviours and sustains ongoing participation (Orr & Jadhav, 2018; Cavicchi et al., 2022). The feature of social sharing, through features like achievements or community challenges, helps develop a collective sense of responsibility and further enhances user engagement (Santana & Gil, 2019; Agost & Vergara, 2020). Besides, it is important to develop critical thinking in users. Interfaces designed to encourage the user to investigate and question-allowing, for instance, the manipulation of variables in an interactive visualization-enable a deeper grasp of sustainability at a more personal level (Makhubele et al., 2021). Access to a variety of perspectives and sources of information empowers independent opinions and more informed decision-making processes. Irizar-Arrieta et al. (2018), Smith et al. (2020) Ethical considerations in attention design add another layer of complexity: while gamification can draw users in, designers must ensure they do not unintentionally promote superficial participation or distract from core sustainability objectives. Sakir (2024). Pravis' such as transparent communication of goals and possible consequences increase trust, as does inclusive interface design that caters for a variety of user needs (Yang et al., 2022; Akhtar, 2024). In general, considerate interaction design, real-time feedback, critical thinking features, and ethical attention strategies can, in combination, result in meaningful experiences that engage not just the users but also mobilize them towards concrete sustainability action.

2.3 Visual Impression Management, Transparency, and Greenwashing

Visuality management refers to organizational strategies of manipulation through design elements, such as charts, infographics, or framing narratives, to elicit desired emotional

and cognitive responses. In sustainability reporting, for example, color-coded progress bars might highlight positive trends while relegating disclaimers about methodological shortcomings to fine print. Not all of it is necessarily unethical; it may be a clear message to a larger audience. However, excessive aesthetic curation bears the risk of concealing relevant information and ultimately damaging user trust (Rodrigues & Franco, 2019). Authors point out that in the case of dashboards that present only selective successes or exclude unfavourable metrics, there is a heightened risk that such stakeholder communication may be perceived as deceitful (Šimunović, 2024). Greenwashing underlines the tension between appearance and reality within sustainability discourse. Corporations that tout ESG credentials without aligning them with verifiable metrics may suffer reputational harm and alienate stakeholders (García-Sánchez et al., 2019). Although external audits or adherence to frameworks like the GRI and TCFD can bolster legitimacy, these signals must reflect authentic performance rather than serve as mere window dressing. Designers play a vital role here in incorporating disclaimers and transparent data sources that temper scepticism while keeping visuals comprehensible. A balance between stylistic impact and verifiable reporting is key to maintaining public trust.

2.4 Digital Product Teams and the Role of Designers as Information Mediators

The development of sustainability dashboards reflects wider changes in digital product development. Traditional reporting teams would often operate in siloed structures, where sustainability experts compiled the ESG metrics, which then needed to be formatted as static reports by communication specialists. In contrast, modern approaches integrate design, data science, sustainability management, and user research in agile feedback loops (McMahan et al., 2021). An integrated model allows for real-time adaptation of dashboards in response to new frameworks, changing user expectations, and the ever-changing ESG landscape. Designers' roles have grown to be much more than just aesthetically pleasing, now acting as an "information mediator." Designers team up with data scientists and subject matter experts to translate technical data into an engaging, user-friendly interface. They embed narratives or educational aids that could help general audiences understand complicated metrics and make sure navigation remains intuitive (Wiyanto 2016; McMahan et al. 2021). This role also involves reconciling brand identity with methodological integrity so that a desire to showcase positive achievements does not overshadow the need to present a balanced representation of organizational sustainability practices (Kunneman & Filho, 2020). User-informed iteration cycles allow them to be iteratively refined, incorporating user-cantered principles with ethical considerations of reporting. Recent research has shown that these integrations of design, data science, and sustainability are not only improving the quality of the products but also foster much more responsible use of data. This collaborative mindset, which has permeated these evolving digital product teams, as expounded in detail by Yanran 2023 and Mulyani et al., 2020, reflects a greater shift toward seeing ESG communication not as some static, one-way flow of figures and claims but rather as a dynamic conversation.

3. Methodology

3.1 Research Design and Rationale

This qualitative comparative case study will seek to understand how design principles and interaction strategies shape trust in corporate sustainability dashboards. Eni and Enel are the two dominant players in the Italian energy sector, with well-publicized

sustainability ambitions, representing an ideal contrast in terms of data visualization, narrative integration, and user engagement. These cases will enable further interrogation of design's capacity to structure user perceptions of progress and accountability.

3.2 Data Collection

Data are collected in multistage. Publicly available documents were sourced, including annual and sustainability reports from 2019 to 2023 of each company under study, with the purpose of understanding how its messaging evolved, the extent to which data are disclosed, and what strategic goals have been declared. Direct dashboard analysis, "Eni for" and "Beyond Reporting," was performed multiple times on several devices and in different screen resolutions, capturing interface structures, interactions, visual designs, and text comments. This observation gave real anchor points for interviewing the interviewees on design decisions and the integration of user feedback.
Semi-structured interviews then followed, averaging an hour each, conducted with a total of fifteen professionals across both organizations. Participants included designers, product owners, sustainability managers, and UX researchers to account for diverse insights into design, data integrity, brand communication, and user-centric goals. Interviews were coded as transcripts using the method of Thematic Analysis on issues such as how data complexity was dealt with, how design was used to maintain or improve credibility and how the teams aimed to engage different user personas. Due to confidentiality agreements, it is not possible to directly cite the quotes by individual roles. However aggregated findings form the basis of comparative insights presented in this paper.

3.3 Evaluation Dimensions

The core analytical framework focuses on four dimensions in which similarities and discrepancies between Eni and Enel are tracked: information design, trust-building, engagement, and critical thinking. Information design here examines coherence, hierarchical structuring, and visual clarity; trust-building investigates the presence of transparency practices, methodological references, and external validation signals. Engagement assesses levels of interactivity, UX fluidity, emotional or narrative resonance, and user empowerment in data exploration. Critical thinking takes into account the way in which each platform supports or constrains comparative analyses, reveals uncertainties, and uses ethical design features that may facilitate or hinder objective interpretations.

This multilayered approach offers a balanced view of how each company's design decisions shape stakeholder perceptions. In triangulating the findings, the study accounts for potential distortions, such as the presence of brand-specific colour palettes, differences in user feedback channels, or the selective nature of interviewee experiences. Although the analysis reflects a specific temporal snapshot, these case-based observations highlight recurring design patterns, trade-offs, and best practices that can be generalized to other contexts where sustainability reporting seeks to earn public trust and encourage more informed engagement.

4. Comparison Cases

4.1 Eni’s “Eni for”

The sustainability dashboard of Eni welcomes visitors with high-impact visuals strongly reflecting brand identity. Bold colour contrasts, often involving the company's signature yellow and black, punctuate the homepage with quick snapshots of strategic pillars, narratives describing transitions toward greener operations, and short success stories.

The initial impression is one of confidence and forward momentum, underlined by banners proclaiming reductions in emissions or expansions in renewable energy partnerships. [Figure 1]

Figure 1. Eni For – Landing Page

A deeper examination, reveals that Eni's platform offers limited real-time manipulation of data within the dashboard itself. Interactive elements exist—such as hover-enabled tooltips for charts—but the platform tends to redirect users to external PDF reports or embedded links if they seek comprehensive data sets or detailed methodological explanations [Figure 2]. According to one of Eni's design leads, this approach arose from the internal tension between providing immediate, highly distilled information to broad audiences and allowing deeper exploration for experts. The final result leans toward a streamlined experience, guiding casual visitors through summarized infographics, while leaving more specialized data analysis to downloadable documents.

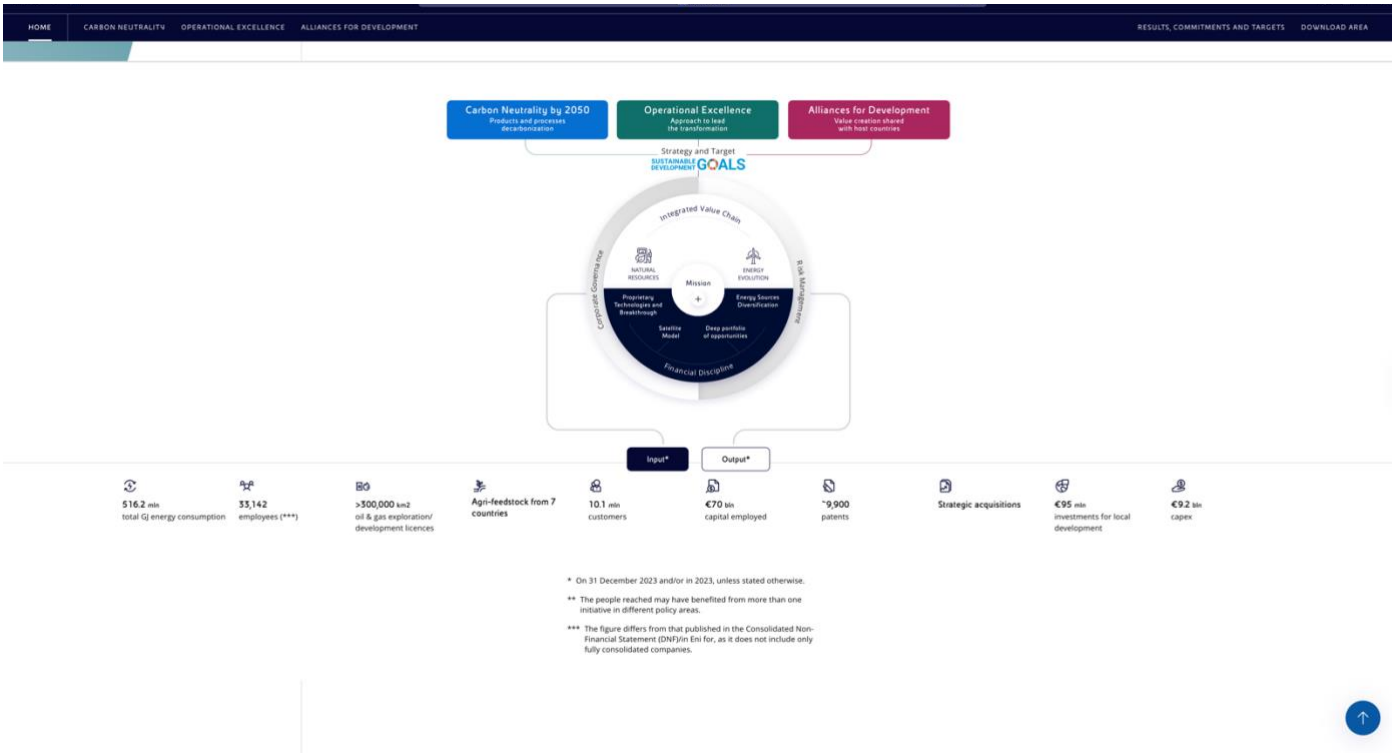

Figure 2. Eni For – Infographics of the Goals

The main positive here is that it keeps the website uncluttered and can communicate, rather quickly and visually, the major achievements by Eni. However, it also limits the possibility of immediate user-driven comparisons for different indicators or time spans. Looking from the trust viewpoint, the platform references recognized frameworks, usually in footnotes, and signals alignment to global standards like TCFD. These textual disclaimers suggest data are "verified" or "externally assured," but here the user would need to make an additional step in order either to access them or confirm it. This aspect of design, though readable from the perspective of pragmatic simplicity, can also lead to concerns the platform accentuates favourable data with much more strength than ambiguous data or challenging metrics [Figure 3].

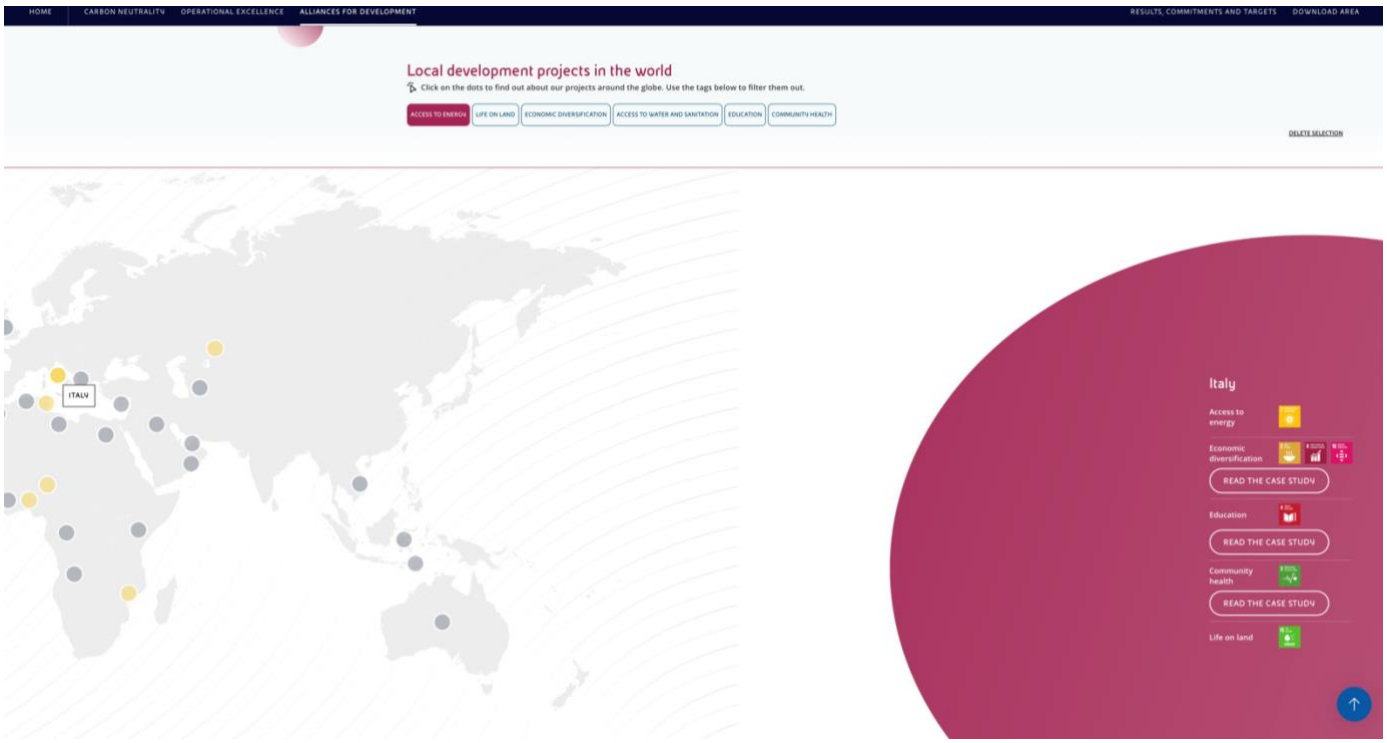

Figure 3. Eni For – Infographic Maps

According to these, they aim to keep positive milestones front and centre, viewing the website as a window into Eni's evolving trajectory rather than a "raw data clearinghouse." While the platform might embed disclaimers and references to partially met goals, it remains more celebratory than self-critical in tone. This characteristic can also raise scepticism in users, who might expect interactive dashboards to balance achievements and ongoing-perhaps underdeveloped-aspects of performance (Šimunović, 2024). Though the choice by Eni might be appropriate in a brand communication strategy, this underlines how complex the relationship between marketing imperatives and imperatives of transparency in reporting can be when one is designing a sustainability dashboard.

4.2 Enel's "Beyond Reporting"

The "Beyond Reporting" platform of Enel runs with a cleaner and more minimalist aesthetic, using lighter background tones, expansive whitespace, and well-orchestrated typographic hierarchies. It was scrolling through the homepage by users with scarce narratives in measured sequences, referring to matters such as decarbonization, the circular economy, and social development initiatives. Each segment brings on a story with data visualizations responding to user inputs like year selections or geographic filters [Figure 4]. This approach points toward a more integrative perspective on data exploration-that is, guiding the user from an overarching narrative to specialized details without switching to separate reports

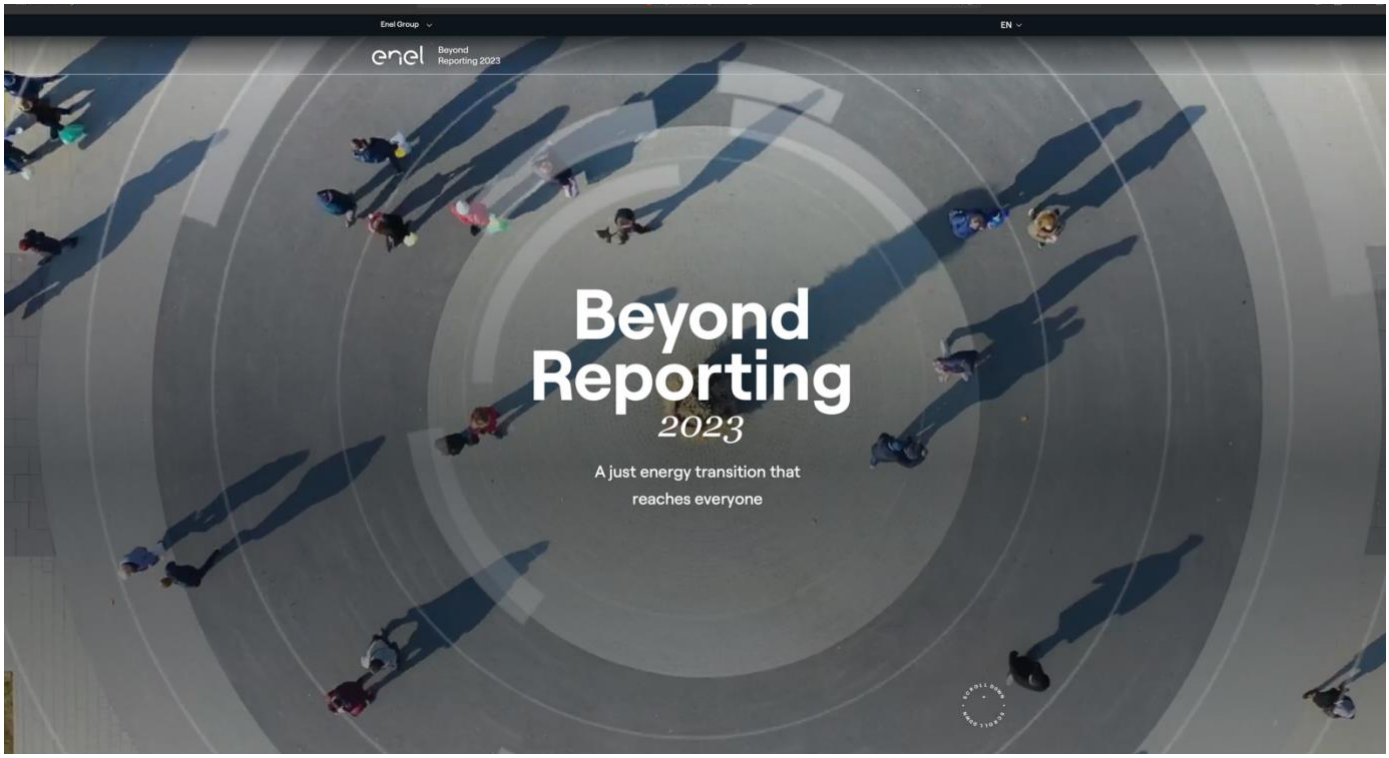

Figure 4. Enel Beyond Reporting – Landing Page

Methodological transparency in Enel often extends beyond the usage of short footnotes, locating data definitions, references to third-party audits, and alignment to recognized frameworks in side panels or collapsible sections within the main interface. This design choice helps to respond to user concerns with "where the numbers come from,"

alleviating the friction created by opening several PDFs. It frames the platform as an evolving, living repository rather than a promotional page.
Engagement strategies for Enel's users are based on scroll-telling, short animations, and interactive visualization of historical and current performances. One could follow how the renewable capacity of the company has grown over several years, embedded links explaining how that capacity is calculated, cross-referencing with greenhouse gas emission reductions. Their ambition was to go further in creating a deeper user connection by merging brand messaging with active learning tools through interviews.

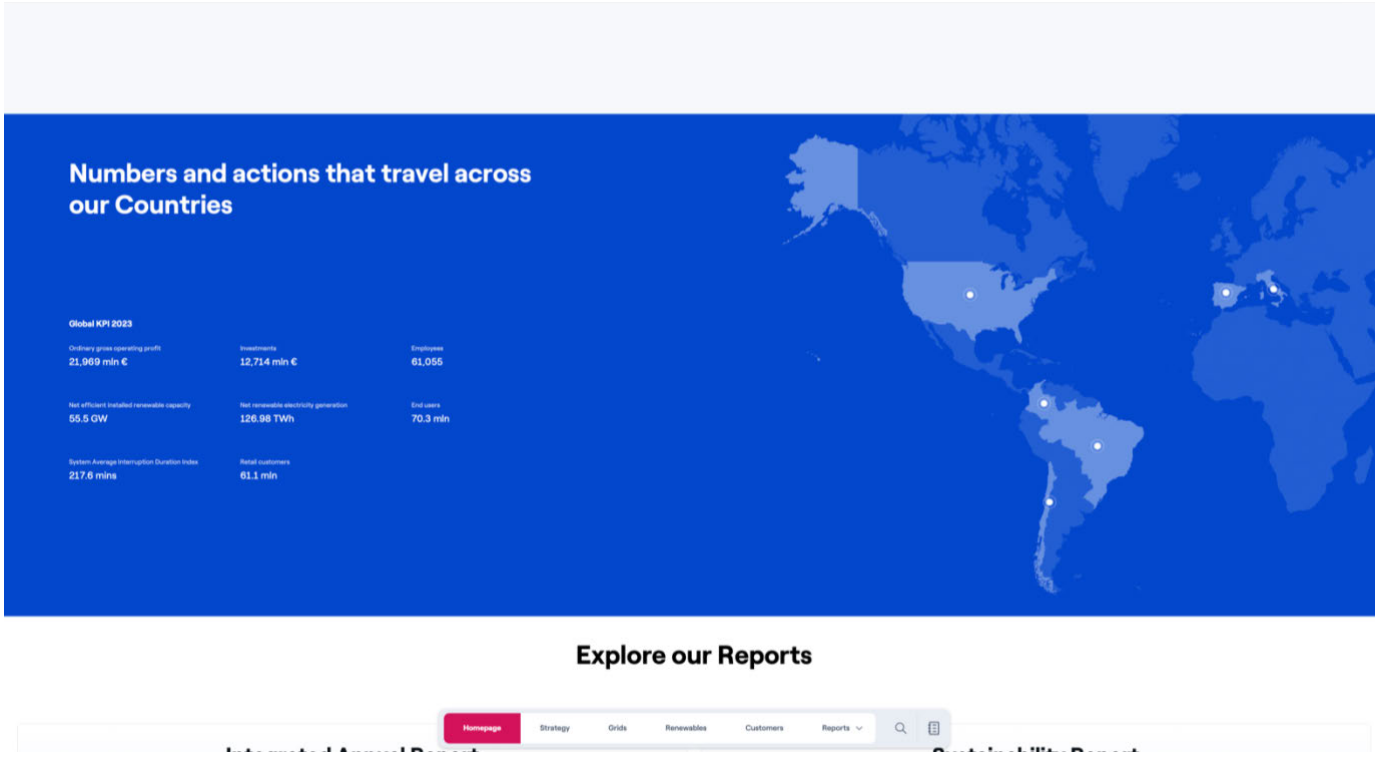

Figure 5. Enel Beyond Reporting – Infographic Maps

Although there are apparent strengths in the platform, a number of glaring criticisms regarding framing the narrative somewhat selectively do tarnish its result [Figure 6]. Indeed, although Enel does discuss some challenges, mainly setting these against the context of transition hurdles towards ambitious targets will probably soften some realities that will be delayed or missed. Yet, the presence of disclaimers and footnotes throughout the site reduces the risk that users view it as overtly promotional.

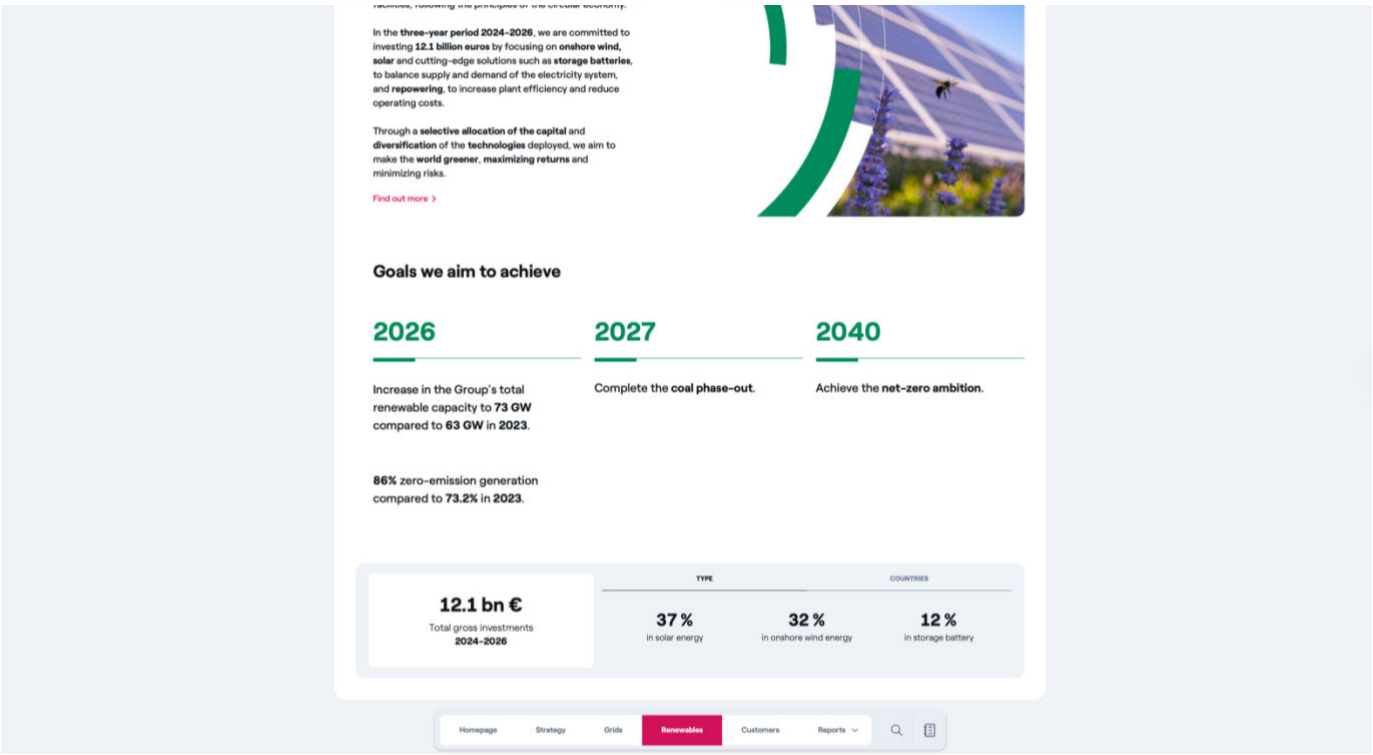

Figure 6. Enel Beyond Reporting – Some data reports

Feedback from the users through interviews and partial user testing data indicates that the investment professionals and policy analysts go for deeper explorations or downloading of data within the tool, while casual visitors remain at top-level narrative blocks or videos. This may hint at the dual nature of this website: professional scrutiny and general public outreach.

5. Discussion

5.1 Observed Commonalities and Divergences

Eni and Enel have a common strategic objective in using design-based storytelling and interactive visuals to build perceptions about their respective energy transitions. Both firms draw on colour theory, brand-specific iconography, and short narratives depicting either community projects or technological breakthroughs. Their reports denote commitments to known frameworks, and both dashboards refer to external validation or audited metrics. The key divergence is found in how each platform structures user exploration. Eni encourages a concise, aesthetically driven “first impression,” relegating granular data to external PDF resources. Enel attempts to embed detail within the platform itself, enabling real-time data toggles and direct references to methodological clarity in-situ.

This duality reflects each company’s internal decisions regarding what user segments to prioritize. The Eni website, on the other hand, encourages quick scanning and brand-based storytelling, probably better suited to the general audiences or potential partners who want an overview. Here, Enel's approach definitely better accommodated users who had an appetite for deeper data interrogation and ongoing updates, possibly offering a stronger bulwark against greenwashing suspicions. Neither approach is "wrong," but they represent different design philosophies about how to balance clarity with detail. They also

show how two organizations in the same sector can deploy design in divergent yet purposeful ways.

5.2 Tensions Between Marketing Aims and Ethical Transparency

One common tension was the conflict between marketing imperatives and the ethical imperative to be transparent with regard to the sharing of data. Respondents from Eni and Enel both agreed that top management would prefer underlining success, brand identity, and forward-looking statements, while domain experts or user researchers would propose deeper, even-handed coverage of achievements and setbacks. These tensions materialize in design decisions, such as how to position disclaimers or how to word textual explanations for partially met goals, among other design decisions (Rodrigues & Franco, 2019). In each case, design is not solely about visual aesthetics but about strategic trade-offs between brand messaging, user autonomy, and the moral imperative to present data honestly.

Therefore, the notion of "ethical design" in sustainability dashboards involves not only how well the user experiences the interface but also how the organization balances promotion with forthright disclosure. Greenwashing can thrive under conditions where marketing overshadows data accuracy or omits critical context (Gelmini, 2017). Accordingly, in mitigating such risks, Enel embedded references to external assurance, more interactive modules function as a possible safeguard by putting details and disclaimers within users' immediate paths. As Eni operates more through their external downloads, it may come under suspicion on the part of those who find hidden data dubious. Yet these perceptions will also depend on user motivations: an inquisitive stakeholder may accept Eni’s system if they trust the externally assured documents, while a casual viewer might remain unaware of the deeper data behind the polished visuals.

5.3 Facilitating Critical Thinking Through Design

Designers interviewed at both firms voiced aspirations to guide users beyond mere acceptance of corporate narratives toward active questioning. They made reference to the use of progressive disclosure: making simple visuals, for example, but then displaying richer layers for a click or hover, letting different user groups find their comfort zone (Buono et al., 2020). Still, they express a need toward standard frameworks indicating anomalies or estimates, which themselves support stakeholders with posing critical questions. However, in practice, these platforms go differently. Eni speaks about deeper metrics only after it bounces the user to a PDF, potentially breaking the interactive flow. InEnel's in-dashboard disclaimers and toggling direct data foster a more continuous learning experience, though not all visitors will choose to avail themselves of those resources.

Building critical thinking capacities requires transparency over data derivation. Both speak about their auditing processes, but presence and accessibility diverge. Overcoming user skepticism often relies on how swiftly and clearly a platform can address questions about where numbers come from or how they are validated (Šimunović, 2024). Visual explanations, side panels specifying the source of each metric, or short videos featuring sustainability experts can reinforce user confidence while underscoring the complexity of ESG measurement. This approach also follows the thinking that design can act as knowledge intermediary between distinct data sources and larger groups without specific knowledge relating to energy or emission accounting.

5.4 Reflections on Cross-Disciplinary Collaboration for Sustainability

Dashboards

A significant part of both sites is a function of cross-functional teams, bringing together design, data science, and sustainability disciplines. In fact, interviewees identified iterative sprints and user feedback as key in refining not just the user interface but also the data narrative: everything from deciding which metrics to foreground, to calibrating how often updates should appear on the dashboards. Often, the friction between brand custodians and data analysts itself produced constructive debates about user experiences that led incrementally to modification. This corroborates the arguments by Mulyani et al. (2020) that agile frameworks, in collaboration with domain expertise, will create stronger and better-adaptive final products in ESG communication.

Such frameworks also explain the trend to evolve responsibilities of designers as information mediators. The designers at Eni described balancing leadership's emphasis on brand identity with technical inputs from sustainability managers and arriving at a compromise focused on simplified visuals for general audiences. According to their product managers, the design teams at Enel started off with similarly brand-driven constraints but increasingly championed deeper in-dashboard detail, partly to appease specialized user segments-e.g., investors, analysts, NGOs-who had asked for more robust real-time explorations. It is in such an environment that design decisions will be less about a monolithic and static phenomenon but more a continuous outcome of negotiations across corporate hierarchies, user needs, and ethical aspirations.

6. Toward a Design Framework for Interactive Sustainability Dashboards

The comparative insights provided by Eni and Enel's practices create a wider perspective on how such a dashboard can reach credibility, engage different audiences, and balance aspirational messages with transparent disclosure. Each one of the two platforms demonstrates some trade-offs, but a number of recurrent strategies are present that could form the base for a design framework for organizations willing to enhance their sustainability reporting. Ideally, the design framework for sustainability reporting platforms would be composed of conceptual pillars: information design, ethical commitments, user-cantered engagement, and agile adaptation.

One core principle is to align the visual hierarchy with the data hierarchy. Accomplished designers make sure that the very most important data points are most visually prominent, while complementary or secondary data are available through progressive disclosure in a layered presentation that suits casual users interested in an overview and specialists needing in-depth analytics. The Eni and Enel platforms reveal variations on how to sequence information: from quick visual summaries that funnel deeper exploration to direct real-time toggles embedded within the main page. At the core, there is one principle: data significance shall guide its appearance, not solely brand aesthetic.

A second key pillar deals with providing pathways for user-driven critical inquiry. Sustainability data often consists of many variables, with overlapping time horizons. Dashboards can enable critical thinking by comparing across metrics, visualizing historical trends, and performing scenario analysis. Enel's interface best depicts interactive timelines and scroll-telling that foster curiosity, while Eni underlines the role of external, more technical documents. Advanced filtering or data overlays within the main interface, integrated by at least some dashboards, will increase user autonomy. By

adding disclaimers, clarifications, or "Why this metric matters" panels around each chart, organizations encourage reflexivity rather than blind acceptance.

Another fundamental building block is Embedding Transparent Methodological References directly in the interface. It should not be that users have to search through long PDFs to validate data credibility. Similarly, footnotes, side panels, or collapsible text boxes outline the standards that are applied to create the metrics, such as GRI, SASB, and TCFD, when auditing is taking place, what assumptions were used, and so on. Doing so would parallel research into how digital trust may be established-the ease of accessing and comprehensiveness of explanations about data origins can allay suspicions of selection bias (Smith et al., 2022; Šimunović, 2024). While Eni relies more on linked external documents, Enel's embedded references hint at a more integrated model that fosters in-the-moment check.

A fourth pillar pertains to Ensuring Narrative Integrity, wherein the storytelling elements-textual overviews, embedded videos, or case studies-of the dashboards truthfully reflect the substance of the data. The risk of greenwashing escalates when "success stories" overshadow or omit contradictory metrics, inviting doubts about authenticity. Effective dashboards would have both successes and challenges together on display, pointing out partial or unmet targets and explaining how the organization will address them. This balance may actually serve to increase user trust by demonstrating an intent to share current struggles, rather than simply providing marketing stories (Rodrigues & Franco, 2019).

A fifth foundation would be to create mechanisms for continued feedback and iteration. Agile digital product teams may embed mechanisms within dashboards where users can communicate confusion, seek clarification, or suggest additional depth. Such recursive processes spur iterative interface refinements and data augmentations. This helped Eni manage brand constraints through design sprints, while Enel employed user feedback in support of sophisticated interactive capabilities. In both cases, cross-functional dialogues among designers, data analysts, and sustainability stakeholders proved to be pivotal in shaping final outcomes. A formalized feedback channel might stimulate more vigorous community involvement and real-time alignment with the evolving nature of the data [Figure 7].

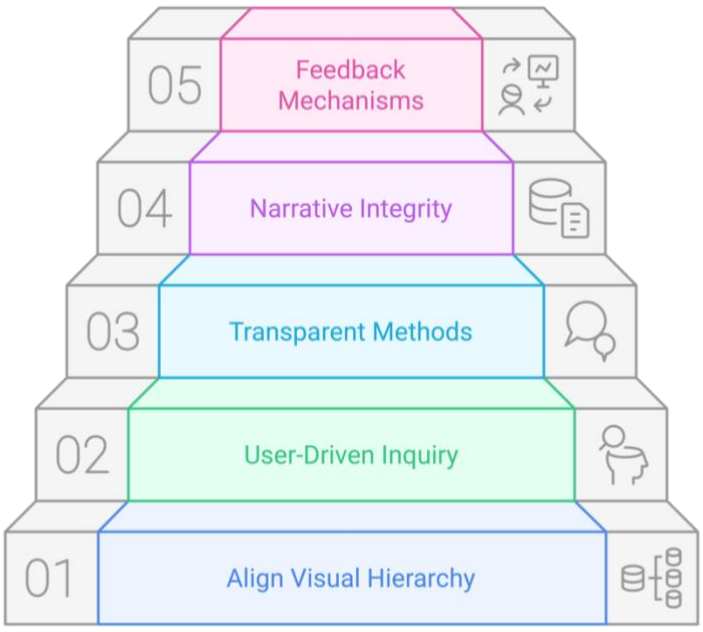

Figure 7. The Five Pillars for a Sustainable Dashboard

Taken together, these pillars put forward a robust design framework leveraged from best practices identified in both the Eni and Enel dashboards. By marrying layered information presentation with methodological transparency, balanced storytelling, and iterative user testing, the dashboard can move beyond one-dimensional brand promotion into serving as a credible, dynamic resource. The framework would have a number of wide-ranging applications well beyond the energy sector itself: from consumer goods to financial services, the ESG issues are no less pressing. But across all fields, the alliance of design thinking and ethics will change static disclosures into transformational vehicles of communication.

7. Conclusion

The comparison of Eni's "Eni for" and Enel's "Beyond Reporting" underscores the centrality of design and user interaction strategies in shaping trust and engagement within corporate sustainability reporting. While both dashboards represent serious attempts to communicate ESG data visually, they reflect divergent philosophies regarding data depth, user autonomy, and brand emphasis.

Eni's succinct layout and brand-centric visuals appeal to broader audiences seeking quick overviews, though readers must consult external resources to verify details. Enel's integrated interface, offering interactive toggles, in-dash methodological references, and scroll-telling, caters more thoroughly to varied user expertise levels. Yet both platforms demonstrate how design elements can enhance or potentially compromise perceptions of transparency, depending on how thoroughly corporate challenges, uncertainties, and partial progress are disclosed.

These findings chime with more general discussions around digital trust-building, greenwashing, and the interaction between design and ethics. Accordingly, there is an increased need by stakeholders for nuanced, user-friendly dashboards that go beyond showcasing achievements to include obstacles and ongoing targets in a balanced presentation. When design choices fall short of this demand, accusations of selective reporting or impression management can arise rather too easily (Šimunić, 2024). Conventional dashboards, on the other hand, provide open data references, real-time comparisons, or disclaimers related to incomplete metrics because their visual narrative corresponds to real-world performance complexity. Designers function instrumentally, nor merely as aesthetes, in deciding how users encounter data, navigate uncertainties, and make judgments.

The proposed design framework articulates several guiding principles that may lead organizations toward more authentic and interactive sustainability reporting. The design teams could transform dashboards into catalysts of informed discussion and continuous learning by embedding the visual hierarchy in data importance, methodological transparency within dashboards, and offering storylines that account for failures alongside triumphs. Set within agile product development, feedback loops can help distill this over time, enabling the evolution of dashboards that reflect the evolving realities of ESG. And in the final analysis, clear content, user-focused interfaces, and ethical imperatives may turn out to be just what it takes to change not only how companies do their measurements but also how they collaborate with their stakeholders to carve out more responsible and accountable pathways forward. Although Eni and Enel belong to a unique sector and cultural context, the examples derived from their dashboards give

meaning for a variety of industries around the world on how design principles, data integrity, and public trust can combine in a strong engine for sustainable innovation.

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Epistemic Virtues and Vices in the Design of Digital Media: The Case of Legal-Checking in the Media Les Surligneurs.

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ABSTRACT | This paper examines the epistemic virtues and vices embedded in digital media design, using the case of Les Surligneurs, a legal fact-checking platform. By integrating virtue epistemology and the Values in Design (ViD) framework, this study highlights how design choices shape epistemic values such as understanding and transparency, while also exposing potential epistemic risks.
Virtue epistemology offers a normative perspective that links knowledge acquisition to intellectual virtues such as impartiality. Traditionally applied to individual agents, this approach has been extended to institutional and digital contexts, where platforms can foster virtuous engagement or reinforce epistemic vices. In parallel, the Values in Design (ViD) approach critiques the notion of technological neutrality, emphasizing how artifacts embed moral values. Combining these perspectives, this paper proposes a framework for analyzing epistemic virtues and vices in digital media at three levels: designers, platforms, and users. By structuring the analysis through these three dimensions, this study offers a comprehensive understanding of how digital environments can shape knowledge practices. Furthermore, this analysis examines how key epistemic values are embedded in digital media design and how their realization depends on the interplay between epistemic virtues and vices. While epistemic virtues facilitate the actualization of these values, epistemic vices create obstacles that hinder their realization.
To illustrate this relationship, this study examines Les Surligneurs, a platform uniquely positioned at the intersection of law, journalism, and digital design. Unlike traditional fact-checking initiatives, Les Surligneurs specializes in "legal-checking," assessing the accuracy of legal claims made by public figures.

Les Surligneurs exemplifies the epistemic value of understanding by integrating legal expertise and pedagogical design into its digital platform. By relying on legal scholars to verify claims and structuring content for accessibility, the platform fosters public comprehension of legal reasoning. Its design, featuring journalistic aesthetics, progressive explanations, and color-coded labels, balances clarity with complexity, countering legal misinformation while mitigating the vice of oversimplification. The platform embodies the virtue of pedagogy by prioritizing clarity while maintaining the depth required for legal accuracy. However, challenges remain, including the risk of reducing legal nuances and limited outreach beyond fact-checking-engaged audiences.
Transparency, another core epistemic value, is realized through rigorous verification processes, methodological disclosure, and participatory engagement. The platform upholds the virtue of

sincerity by openly presenting its verification methodology and encouraging public scrutiny. Yet, transparency also introduces vulnerabilities, as fact-checking platforms like Les Surligneurs are targeted by disinformation campaigns led by actors who exhibit the vice of insincerity and exploit open verification mechanisms. Additionally, the opacity of claim selection and content curation risks perceptions of bias, potentially undermining trust in the platform's neutrality. To enhance epistemic integrity, greater editorial disclosure, clear criteria for claim selection, content diversification, and strategic safeguards against manipulation are needed.
Thus, this study argues that embedding epistemic values in digital design is essential for fostering responsible information ecosystems. Beyond epistemology, this discussion intersects with broader ethical and political considerations.

KEYWORDS | DIGITAL DESIGN, INFORMATION, SOCIAL EPISTEMOLOGY, LEGAL DESIGN, TRUST, VIRTUES, VICES, VALUES, UNDERSTANDING, TRANSPARENCY

1. Introduction

Digital environments reshape information production, sharing, and understanding, influencing knowledge acquisition and dissemination (Choo, 2016). As designed artifacts, they mediate user interactions, structuring engagement through algorithmic content delivery, shaping epistemic experiences, and impacting trust in knowledge.

Political epistemology provides tools for analyzing digital media's influence on misinformation and public trust. The rise of "post-truth" discourse and epistemic bubbles heightens these concerns (Hannon & de Ridder, 2021). Trust, central to digital interactions (Doueihi & Domenicucci, 2018), is undermined by engagement-driven design. Hidden ads, dark patterns, and opaque algorithms foster epistemic opacity and user manipulation. Given these challenges, fact-checking platforms have emerged as institutional responses to the erosion of trust. Fact-checking platforms such as PolitiFact, Snopes, and Les Décodeurs strive for neutrality and transparency but face scrutiny over their effectiveness. Their credibility hinges not only on content accuracy but also on how design fosters trust and engagement.

A particularly complex domain is legal misinformation, where misinterpretations of legal rules influence public debates and policy decisions. Legal discourse's complexity necessitates accessible legal information, which legal design aims to improve (Ducato, Strowel, & Marique, 2024). The legal-checking media Les Surligneurs exemplifies this approach, ensuring legal verification is both rigorous and comprehensible. While not explicitly within legal design, its concise formats balance accessibility with legal precision, addressing misinformation and trust challenges in legal discourse.

This paper integrates virtue epistemology and Values in Design (ViD) to analyze digital media and in particular fact-checking platforms' role in shaping knowledge. Virtue epistemology assesses epistemic virtues and vices in knowledge practices, while ViD emphasizes embedding human values in technology. Extending ViD to epistemic values such as understanding and transparency highlights how design impacts knowledge production. The case of Les Surligneurs illustrates virtuous design fostering these values while acknowledging potential epistemic vices. This dual perspective underscores design's centrality in fostering epistemically responsible digital environments.

I am conducting a doctoral research (CIFRE) at *Où sont les dragons*, a design agency that shares part of its ecosystem with *Les Surligneurs*. While the agency has collaborated with the platform by providing design services, it was not involved in the strategic development or management of the platform. The two entities share a co-founder, but this connection had no influence on the research or analysis conducted in this paper.

2. Theoretical Framework: Exploring Epistemic Virtues, Vices, and Values in Digital Media Design

2.1. Virtue Epistemology and Values in Design: Two Approaches to Understanding Virtues and Vices in Digital Media Design

First, virtue epistemology is a relevant approach for capturing epistemic vices and virtues in digital media design. Virtue epistemology links intellectual virtues, such as impartiality and intellectual perseverance, to knowledge. As Linda Zagzebski argues, this normative approach redefines knowledge as a state achieved through acts motivated by intellectual virtue, moving beyond classical epistemology's focus on justified true belief (Zagzebski, 1996). Zagzebski highlights virtues as traits rooted in motivation and excellence, while Quassim Cassam critiques this motivational emphasis, defining intellectual vices as intellectual failures, such as arrogance or superstition, that negatively impact our intellectual conduct by obstructing the acquisition of knowledge (Cassam, 2019). Pascal Engel extends the analysis by associating virtues with adherence to epistemic norms and contrasting high-level moral virtues with lower-level cognitive limitations (Engel, 2019). Virtue epistemology also examines the epistemic behaviors of individuals and institutions. While traditionally focused on individuals, thinkers like Miranda Fricker apply virtues to institutional contexts, emphasizing ethos and collective responsibility (Fricker, 2020). Furthermore, virtue epistemology proves insightful for analyzing digital environments. Platforms foster or hinder epistemic virtues, influencing users' behaviors. Richard Heersmink's proposed virtues, including intellectual humility and perseverance, are crucial for promoting responsible engagement in online spaces (Heersmink, 2018).

This approach finds enrichment through the multidisciplinary perspective of Values in Design. Values in Design (ViD) is a broad interdisciplinary approach that examines how artifacts, in general, incorporate and promote values such as autonomy, privacy, and equity. Originating in Batya Friedman's Human Values and the Design of Computer Technology (Friedman, 1997), ViD critiques the notion of technological neutrality, building on Langdon Winner's assertion that artifacts, from infrastructure to everyday tools, often embed political or social values (Winner, 1980). While ViD is not limited to digital artifacts, its principles apply effectively to digital media, where tensions between moral and economic values often surface.

Virtue epistemology and Values in Design (ViD) offer complementary frameworks for addressing epistemic and ethical challenges in digital media. The literature includes contributions that integrate perspectives analyzed by both frameworks, demonstrating shared goals of fostering epistemic responsibility and ethical design. Building on the notion of "online intellectual virtues", Lukas Schwengerer proposes an account that links individual epistemic responsibility to platform design, emphasizing critical evaluation and resilience against misinformation (Schwengerer, 2024). Online intellectual virtues involve applying epistemic virtues while recognizing the inherent limitations and dangers of the Internet, such as filter bubbles and rapid misinformation. He also argues that user-friendly design encourages an overly trusting attitude by making information seem reliable simply because it's easy to access. This vulnerability can be exploited for manipulation. He advocates for designs that promote both usability and critical thinking (Schwengerer, 2022). Similarly, Figà-Talamanca and Hunting critique Facebook's opaque design for exploiting cognitive integration and fostering ignorance. This process embeds digital platforms into human cognition, shaping how individuals process information. Unlike neutral cognitive aids, Facebook's algorithms and design choices reinforce user dependency while concealing its mechanisms and designers' intentions (Figà-Talamanca & Hunting, 2022). Moreover, Regina Rini highlights how platform design can institutionalize virtuous practices, proposing reputation systems to evaluate user credibility based on the reliability of shared information (Rini, 2017). Jacobs et al. expand this discussion by analyzing power dynamics in socio-technical ecosystems, showing how design constraints shape values like transparency, justice, and autonomy (Jacobs, Kurtz, Simon, & Böhmann, 2021). Both ViD and virtue epistemology advocate improvement through embedding values into artifacts and cultivating virtuous epistemic agents. These frameworks address responsibility at individual and collective levels. These perspectives jointly promote epistemically responsible digital ecosystems.

2.2. Epistemic Values Realized Through Design in Digital Media

Digital Media embodies epistemic values, realized through users, platform design, and designers. Our contribution lies in attributing virtues and vices at all three levels, offering a comprehensive framework for understanding their epistemic impact.

1. **User Virtues and Vices:** Intellectual virtues like impartiality, sobriety, and tenacity, discussed by Boudewijn de Bruin and Luciano Floridi, enhance critical engagement with digital content, while vices like negligence, distraction, and overconfidence hinder epistemic practices (de Bruin & Floridi, 2018).
2. **Platform Design:** Digital Media influence knowledge production through design features such as interface components or default settings. Some designs may increase false beliefs, making it possible to classify platforms as epistemically virtuous or vicious based on their impact on truth production. Alvin Goldman's "veritism" provides a framework for this evaluation by focusing on the quantity of true or false beliefs a system generates (Goldman, 1999). However, veritism misses normative and motivational dimensions, which virtue epistemology can address. We suggest that design elements are virtuous if they foster epistemic virtues and vicious if they promote epistemic vices.
3. **Designer Responsibilities**: Designers bear responsibility for embedding values into platforms. Virtues like epistemic altruism or vices like insouciance shape whether platforms support or undermine epistemic goals.

By attributing virtues and vices to users, platforms, and designers, this paper establishes a nuanced framework that integrates epistemic values at multiple levels of digital media.

Virtue epistemology and ViD provides a framework to integrate a plurality of epistemic values into digital media. While digital media can incorporate various epistemic values into their design, such as clarity, informational balance, or disinterestedness, our analysis will particularly highlight understanding and transparency. These two values are key to evaluating how reliable and well-structured digital environments are, making them worth exploring in this article.

1. **Understanding** involves integrating information into a coherent whole, enabling depth and completeness. Unlike knowledge, which consists of accumulating true beliefs, understanding emphasizes grasping relationships between pieces of information, providing a structured and meaningful perspective. While knowledge can exist in isolated facts, understanding requires connecting these facts to reveal underlying patterns and causal relationships. Moreover, understanding often demands an active cognitive effort, synthesizing information rather than merely receiving it, making it a more holistic and encompassing cognitive achievement (Khalifa, 2017; Kvanvig, 2003; Trout, 2017; Zagzebski, 1996).
2. **Transparency** is a foundational epistemic value linked to the metaphor of light and clarity, enabling scrutiny, accountability, and trust. It lies at the heart of the scientific method (Shapin, 1996). Transparency enables tracing processes behind knowledge claims, ensuring reliability. In contrast, opacity obstructs understanding, as seen in black-box information systems.

How epistemic values manifest in digital media platforms depends on the intellectual virtues of both designers and users. The role of platform design is crucial in this process, as specific design elements can either support or hinder the actualization of these values. A design element is epistemically virtuous if it fosters the exhibition of epistemic virtues and the realization of epistemic values; conversely, it is epistemically vicious if it promotes epistemic vices or obstructs the realization of these values. These criteria provide a framework for evaluating digital media design in relation to its epistemic impact.

To put this theoretical framework into practice, we will explore a concrete example: legal-

checking by Les Surligneurs.

3. Epistemic Virtues in the Design of Digital Media: A Critical Study of Les Surligneurs

3.1. Why Les Surligneurs? A Case Worth Examining

Les Surligneurs, an innovative platform at the intersection of law, journalism, and digital media, specializes in 'legal-checking', verifying the accuracy of legal claims made by public figures. Unlike traditional fact-checking initiatives that verify statements using journalistic and scientific sources, Les Surligneurs relies mainly on primary legal sources. The platform was founded by a researcher in law and a designer with the objective of countering misinformation about the law while making legal reasoning accessible to a broader audience. Les Surligneurs is a relevant case study due to the specific challenges associated with legal information. Legal misinformation is particularly harmful as it distorts public understanding and is frequently leveraged for political purposes. This type of misinformation is especially pernicious, as it exploits both the uncertainty inherent in law and the difficulty of accessing reliable and comprehensible sources. Thus, les Surligneurs helps prevent the spread of false legal beliefs that can serve to justify political decisions or manipulate public discourse.

As a digital media project rooted in academic and journalistic practices, Les Surligneurs exemplifies the importance of integrating epistemic values, such as understanding and transparency, into digital design. The platform's aim to foster trust and improve the quality of information underscores its alignment with the broader thesis of this article: the need for digital media to embody epistemic virtues through deliberate design choices.

By examining the epistemic virtues and vices embedded in the design of Les Surligneurs, this study highlights how specific design elements can support or undermine the realization of epistemic values.

3.2. The Epistemic Value of Understanding: Between Pedagogy and Oversimplification

Les Surligneurs embraces this epistemic value of understanding through both its organizational structure and digital design.

At its core, Les Surligneurs is designed as a knowledge-driven project, embedding expertise into its structure to ensure both accuracy and accessibility in legal verification. This commitment is reflected in its reliance on a team of legal experts, professors, researchers, and practitioners, who not only verify legal claims but also contribute to making complex legal reasoning comprehensible to a broad audience. Les Surligneurs exemplifies epistemic virtue by integrating knowledge by design, aligning with Zagzebski's view that intellectual virtues are driven by the pursuit of knowledge (Zagzebski, 1996, pp. 168-176). Above all, Les Surligneurs seeks to educate a broad audience by enhancing public understanding of legal reasoning while also training law students in legal verification.

This pedagogical mission is also realized through the visual and functional design of the website itself. The platform's visual design reinforces its pedagogical goals. Les Surligneurs adopts a journalistic aesthetic, prioritizing clarity and accessibility, an uncommon approach for legal platforms, which are often dense and text-heavy. Key conclusions appear in yellow boxes, ensuring readers grasp essential rulings before deeper analysis. Articles follow a progressive format, starting with summaries before detailed explanations. This tiered approach allows users to engage with legal information at varying degrees of complexity, aligning with the perspective that understanding exists on a spectrum, one can understand a subject to varying degrees

(Kvanvig 2003, Khalifa p. 215), from basic recognition to deep comprehension.

Figure 1. An article from the legal-checking section of Les Surligneurs

Another notable design feature is the use of color-coded labels such as "exaggerated" or "requires clarification," which introduce nuance absent from binary fact-checking approaches (true/false). This is particularly relevant given that misinformation actors often manipulate legal rhetoric not by making outright false claims, but by exploiting ambiguity, omission, or misleading phrasing. These nuanced labels introduce elements of intentional complexity. They foster an open-ended engagement with legal discourse, counteracting the risk of vicious clarity that could prematurely close off inquiry (Nguyen, 2021). This is particularly crucial in the legal domain, where multiple interpretations coexist, and the law remains an evolving field.

Figure 2. Preview of an article on Les Surligneurs website, yellow label "Exaggerated"

Nevertheless, the pursuit of understanding also introduces epistemic risks. A key concern is epistemic authority: as simplification increases, users must rely more on the platform's judgment in assessing claims labeled as "complicated," or "false." This reliance necessitates recognizing the platform's epistemic authority, raising the question of why users should trust Les Surligneurs over, for instance, a government official. Moreover, the risk of oversimplification remains a persistent challenge, despite efforts to introduce complexity. Summarization is essential for accessibility, yet it can sometimes strip away critical legal nuances, particularly in short-form content such as social media posts. Legal matters often have multiple interpretations, and oversimplification risks obscuring complexities. Furthermore, the reliance on text-heavy formats may hinder engagement for audiences unfamiliar with legal terminology. Expanding multimedia formats, such as infographics or explainer videos, could help mitigate this issue by catering to diverse learning preferences. Additionally, while Les Surligneurs facilitates legal understanding, it primarily reaches those who are already engaged in fact-checking. The platform's effectiveness in countering misinformation is thus constrained by the challenge of engaging individuals who are less predisposed to critical engagement with information. Overcoming this epistemic barrier requires exploring alternative outreach strategies that foster curiosity and facilitate access for broader audiences.

3.3. The Epistemic Value of Transparency: Between Sincerity and Insinserity

Transparency is a core epistemic value in Les Surligneurs' design. The platform realizes this value through concrete design choices: each article follows a well-defined process of drafting, reviewing, and correction, ensuring a rigorous verification framework. It systematically cites legal sources, explicitly outlines its methodology, and employs a double-review process by legal scholars. These practices reinforce trust by allowing users to trace the reasoning behind each claim and independently assess the validity of legal arguments. Furthermore, transparency is reinforced through participatory mechanisms, as Les Surligneurs actively invites readers to engage, submit corrections, and challenge analyses, fostering an open epistemic environment. Les Surligneurs realizes the value of transparency by exhibiting the virtue of sincerity, ensuring that its verification process remains accessible and accountable to the public.

While honesty has received more attention in the literature, we prefer to speak of sincerity, which better captures the epistemic dimension relevant here. Honesty is typically a moral virtue, whereas sincerity is an epistemic one, grounded in the agent's commitment to truthfulness in communication. Sincerity can manifest through transparency, yet transparency alone is not sufficient: one may disclose complex information without genuine effort to make it accessible, thus remaining insincere despite being ostensibly transparent.

However, the commitment to transparency can be distorted by insincere actors who seek to undermine the integrity of fact-checking platforms. Campaigns such as the Russian "Overload" and "Operation Matriochka" illustrate how fact-checkers, including Les Surligneurs, have been targeted through deliberate diversion tactics. These campaigns flood fact-checkers with fake claims and false evidence to drain resources and distract from real misinformation. This strategy exploits the media's transparent processes, where anyone can report potential misinformation, turning a strength into a vulnerability. Transparency must be reinforced with strategies to prevent such deliberate manipulations.

Despite its commitment to transparency, certain aspects of the platform's design introduce epistemic opacity. One significant issue is the selection process for legal-checked claims. Les Surligneurs does not explicitly disclose the criteria for choosing which legal statements to analyze. This lack of transparency can create a perception of bias, particularly if some political or ideological perspectives appear to receive more scrutiny than others (Figure 3). Establishing and publishing a clear selection framework would reinforce the platform's epistemic credibility by demonstrating impartiality in topic selection.

Additionally, the way articles are displayed on the homepage can unintentionally shape public perception of legal controversies. Without explicit guidelines on which pieces are featured prominently, certain topics may seem more pressing than others. This design choice, while not intentionally misleading, illustrates how transparency in content curation is as crucial as transparency in legal analysis itself. Clarifying the rationale behind editorial decisions would enhance the perception of fairness and further solidify the platform's role as an epistemically responsible media outlet.

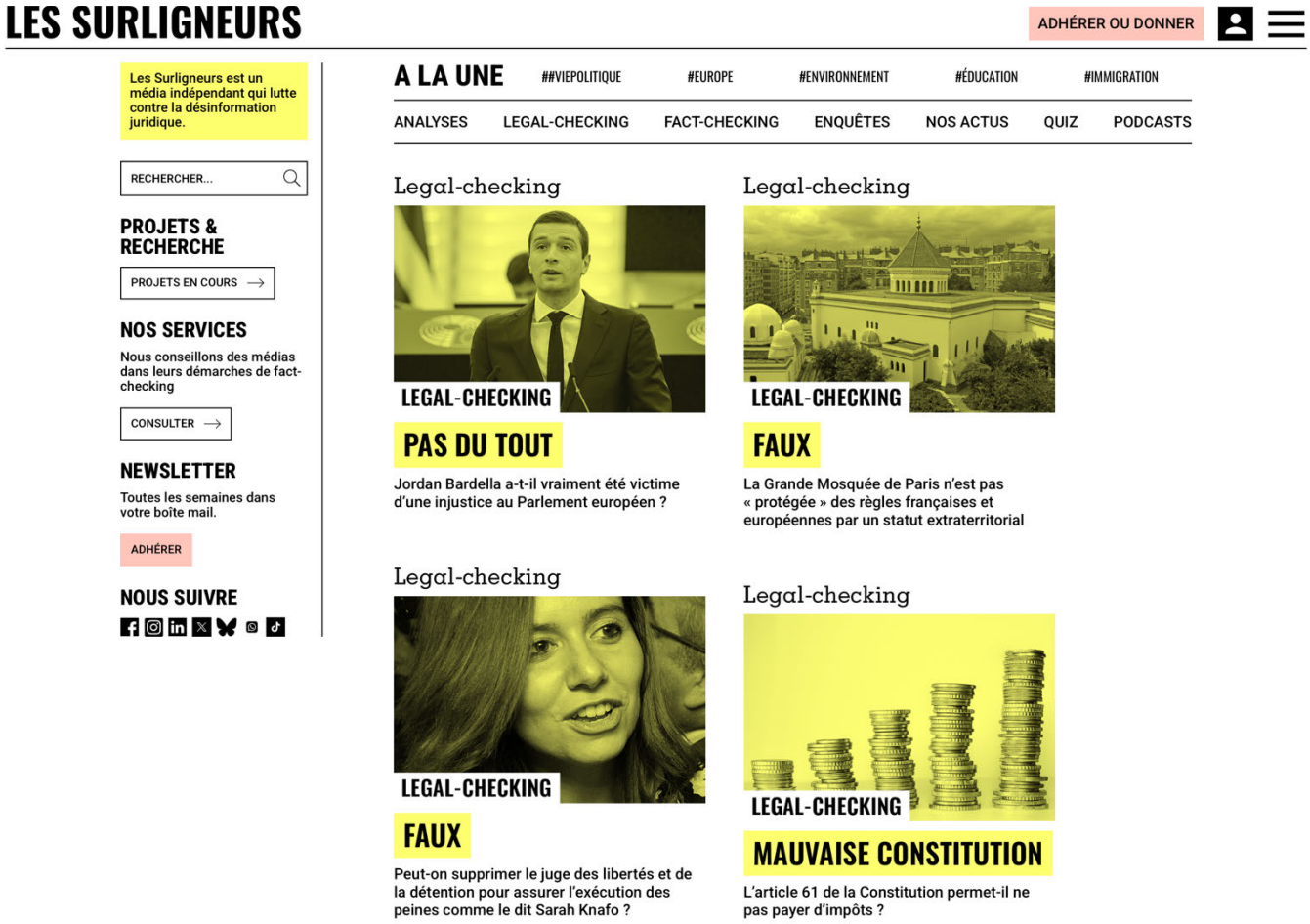

Figure 3. The Legal Checking page. The displayed political figures are from the same political side (French far right).

By analyzing Les Surligneurs, this study highlights how epistemic values such as understanding and transparency can be embedded in the design of digital platforms. Epistemic virtues like pedagogy and sincerity facilitate the realization of these values, whereas vices such as oversimplification can hinder them. These challenges underscore the need for continuous improvements, enhancing editorial disclosure, diversifying content formats, and reinforcing defenses against misinformation, to further align the platform with its epistemic commitments and ensure the rigor and accessibility of legal knowledge.

4. Conclusion

This article has explored the interplay of epistemic virtues, vices, and values within the design of digital media, focusing on Les Surligneurs as a case study. By drawing on theoretical frameworks from virtue epistemology and Values in Design (ViD), the analysis highlights how specific design elements can either realize or hinder epistemic values. The findings emphasize the multiple responsibilities in digital media environments: while designers carry a significant ethical responsibility to embed epistemic values into platforms, users must cultivate intellectual virtues to engage critically and effectively with the information presented. This study extends beyond

epistemics to ethics and politics. Digital media shape both knowledge and democratic engagement. Les Surligneurs aligns its epistemic mission with broader ethical and political goals, striving to protect democratic freedoms and enrich public debate, showing that fostering epistemic virtues also helps sustain democratic values. Future research could explore ways to engage fact-checking skeptics and address disinformation tactics that exploit epistemic virtues. It should also examine how design reconciles competing values, such as balancing clarity and depth. Ultimately, this study underscores the centrality of design in shaping the epistemic landscape of digital media. By embedding epistemic values into platforms and fostering virtuous practices, designers can contribute to the development of epistemically robust ecosystems.

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Exploratory Ethics in Communication Design: Developing a Pedagogy for Lively Ethical Engagements

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ABSTRACT | Almost from the onset of a design situation, a communication designer performs processes that involve tricky ethics, such as issues of representation, environment or politics. Design students in the midst of their graduation project often mention a fear of committing unintentional "ethical blunders", which may be difficult to completely circumvent as designers are increasingly aware of their entanglement with the world. This working paper explores how design students can learn to develop critical understandings that lead to lively engagements with design ethics.

Over the last year, working as a lecturer in a communication design degree programme in Singapore, I have developed an optional design ethics workshop for students working on their graduation projects. In the workshop, ethics are not considered as an absolute set of values, but as socially, culturally and personally situated. In this orientation, tricky ethical situations that tend to be nervously avoided can be approached with renewed curiosity.

This working paper will discuss the insights collected from the workshops so far. The workshop application process provides interesting information on why students would opt for an additional ethics workshop. The workshop outcome as a work-in-progress reflects the students' state of knowledge and thinking process as future communication designers in the making.

KEYWORDS | Communication Design, Design Ethics, Design Pedagogy, Ethics

1. Introduction

Almost from the onset of a design situation, a communication designer performs processes that involve tricky ethics, for instance, crafting representations, or communicating messages with political significance. However, design ethics are rarely given adequate emphasis throughout a designer's education.

Given the vast breadth and diversity of design knowledge and practices, design education institutions can only cover a limited scope in their curricula. Modules with significant theoretical elements tend to be at risk of being eliminated, especially due to "the paradox of the vocational and the humanistic". The humanistic describe philosophic grounding and disciplinary reflexivity, while the vocational refers to a mastery of skills, medium and methods (Parvin, 2019, p. 108). In a neoliberal economy, employability remains a priority, often sidelining ethics in favor of vocational training. As a result, many design institutions dedicate minimal time to ethics at the undergraduate level.

However, in recent years, we have also seen an increasing awareness of design ethics which is driven by pragmatic factors in the form of crises and uncertainties. In the design education institution that I work in, one of the biggest push factors for including ethics in design education come from the students. Design students in the midst of their graduation project often mention a fear of committing unintentional "ethical blunders" which may be difficult to completely circumvent. The notion of ethics in design education tends to be described in a way that is quite fraught with anxieties. For instance, we look to ethics to avoid getting into "mistakes", "misconducts" or "moral failings" such as plagiarism, cultural appropriation, discrimination and more. Thought in this way, ethics become a set of rules that is rigid and inflexible.

Many design educational institutions have research ethics guidelines such as an ethical review board for research involving human and animal subjects, their protective functions are undeniable. However, guidelines are regulatory and do not necessarily engender flexible or creative design ethical thinking.

Over the last year, I have developed an optional design ethics workshop[1] for students working on their graduation projects. "Exploratory Ethics in Communication Design" is a three-part workshop where ethics are not considered as an absolute set of values, but as socially, culturally and personally situated. The challenge that I set for myself and the students is: could we see ethics as a natural part of our design process that is rife with creative opportunities?

This working paper will discuss the insights derived from the process of the workshop application, implementing the workshops, examples of student outcome in the workshop and beyond.

2. Relevant Studies that Have Informed this Paper

Historically, there has been debates around how design as a professional practice should respond to ethical values and ideals. Terms such as "environmental design" (Papanek, 2011, pp. 248–284) or "critical design" (Malpass, 2017) show introspective attitudes towards

[1] Exploratory Ethics in Design Communication is officially described as a "lab" within the final year programme in BA(Hons) Design Communication, LASALLE College of the Arts. The term "workshop" is used in this paper as it is commonly used.

a designer's position and accountability but may not explicitly emphasise "design ethics."

Recently there is more literature that attempts to unpack and frame design ethics. Lindberg et al. proposes that "[e]thical considerations in design can refer to for example ethical concepts or principles related to what to design and the objects of design, methods and tools for ethical design, unintended consequences of design, or the values of designers and design outcomes." Lindberg et al. also considers the notion of ethos to emphasise the pragmatist approach to ethics, in that "[e]thos shapes actions, and actions shape the ethos in return." (Lindberg et al., 2022)

Similarly, Glenn Parsons frames design ethics in three ways (Parsons, 2016, pp. 180–181), firstly "the way that Designers confront and handle ethical rules, regulations and norms that apply to the objects they are creating", secondly "the Designer's very choice of what to create, thirdly, "whether a consideration of the role of Design in how we live implies a fundamental reconsideration of the very concept of ethics itself." The third way of relating design and ethics have been expanded by scholars of design ethics as the possibility of "designing ethics", or, in Chan's words, "in a reversal of directionality from design to ethics, the new possibilities engendered by design may transform existing ethical values."(Chan, 2020, p. 3)

On the other hand, *Tricky Design*: *The Ethics of Things* (Fisher & Gamman, 2019) frames design ethics from the perspective of the designers' frequent encounters with dilemmas. The notion of "tricky design" acknowledges that inherently design and designers are situated within a "problem ecologies", a difficult position that offers both challenges and opportunities.

3. Exploratory Ethics in Communication Design: Process and Discussions

3.1 Brief Background about the Workshop and the Student Profile

"Exploratory Ethics in Communication Design" is a three-part optional workshop for final year students of BA(Hons)Design Communication programme in University of the Arts Singapore, LASALLE (henceforth referred as BADC). The degree focuses on modes of communication design, this include both creative practice skills in a range of digital, print and experiential media as well as writing and research. In their third-year, students would work on their research project with a writing and studio project outcome. Most final year students have gone through reading, writing and critical theory education, without necessarily emphasising design ethics.

3.2 Motivations for applying for a design ethics workshop

The workshop has been run twice over two academic years. In the second-round application, students are asked to describe the research project ideas and their reasons for applying. To interpret this collected data, I coded students' responses to find patterns and insights (see figure 1). The student's sign-up reason and graduation project description are analysed qualitatively to identify relevant themes.

Student: Sign-up reason	Student: Describe your graduation project (maximum of 150 words)	Themes
I use biofeedback data (brain activity) in my research. I believe I need to make sure participants give informed consent, fully understand how their data will be used, and that their privacy is protected. I also need to establish clear guidelines about who owns the resulting artwork and manage participants' expectations about how accurately their unconscious mind is represented. And more...	From my RPO: "The purpose of this research is to explore the use of physiological data as a potential means to foster a sense of authorship. By using a Research through Design (RtD) approach, the study aims to prototype iterations for an interface that generates art based on brain activity, using the unconscious mind to guide the creative process. This research intends to urge critical reflection on the issue of authorship in generative art and offer an experience that can empower artists with their own physiological data."	confidentiality (data), representation (individual), representation (community), technology ethics, ,

Figure 1: This table shows a student's reason for signing up and a brief description of their graduation project on the first two columns. They are then coded with relevant themes on the third column.

The themes selected are categories that are broad and useful enough for analysis without being too general so as to disregard the students' underlying motivations. Conversely, they are not too specific to generate excessive unique codes that hinder productive analysis, especially as the research continues for another year or two. The themes identified pertain to either an area of study in ethics (e.g. technology ethics), issues with ethical conundrums (e.g. interspecies entanglement), or design research methods (e.g. participatory design).

The themes may directly align with students' writing or closely match. If ambiguity arises, I may interpret their work minimally and ensure that eventually the students' own understandings are reflected. More themes may be added in the future as more data is collected. The current full list of themes is shown in figure 2, while the final count of themes is shown in figure 3.

Themes	Subtheme
border politics	
challenging existing values	
confidentiality	data
confidentiality	experience
creativity ethics	
cultural practices issues	
emerging socio-cultural system	
emotional wellbeing	
environmental ethics	
ethical relativism & taboo	
ethnography study	
interspecies entanglements	
moral ethics	
participatory design	
relationship	family
relationship	romantic
relationship	work
representation	community
representation	cultural
representation	individual
technology ethics	

Figure 2: The full list of themes used to code the students' motivation for applying to a design ethics workshop.

Theme (unique)	Count (student)	Breakdown
technology ethics	7	
emotional wellbeing	6	
ethnography study	6	
confidentiality	6	confidentiality (data): 4 confidentiality (experience): 3
relationship	6	relationship (family): 4 relationship (romantic): 1 relationship (work): 1
representation	4	representation (individual): 3 representation (community): 2
cultural practices issues	3	
ethical relativism & taboo	3	
participatory design	3	
emerging socio-cultural system	2	
environmental ethics	2	
border politics	1	
challenging existing values	1	
creativity ethics	1	
interspecies entanglements	1	
moral ethics	1	

Figure 3: Theme count from student responses.

The themes indicate popular study areas among applicants but are specific to this sample. Local context influences trends; for example, technology ethics is prominent, likely due to technology's role in Singapore's knowledge-based economy and design education. Our communication design program also emphasises technology through computing studio modules and theoretical perspectives.

Examples of student projects tagged with "technology ethics" can include studies on AI and its impact on creativity, data surveillance or UX dark patterns in digital platforms. Digital design can have a significant effect towards implementing fair and ethical interactions, or to articulate critiques towards issues in the technological societies. More students now explore emotional and relational topics, such as family dynamics, workplace loneliness, or digital breakups. These projects pose ethical challenges as they

may involve emotionally distressed individuals or personal experiences rarely shared publicly. In such cases, design alone may be an insufficient framework.

Students' responses also often indicate research methods that involve participants, for instance interviews, observations, or participatory research methods. The use of these research methods can become sources of ethical dilemmas, especially when students have insufficient knowledge on research ethics, or are unsure about the best way to position their interaction with the participants.

3.3 Developing a Design Pedagogy for Lively Ethical Engagements

To approach ethics as an intrinsic part of a designer's creative process requires familiarity with ethical thinking. However, seeing ethics as a creative opportunity may be a challenging task, especially if students were previously taught that moral and ethical codes cannot be broken. A classroom that engenders lively ethical engagements should not be too quick to judge "right" or "wrong", but should provide a generous space for design "mistakes" which could be ethical experiments. Hopefully this can become the basis of renewed curiosity and future socio-ethical engagements.

As students come into the workshop with their in-progress research projects, the workshop becomes a gathering place for varying ethical situations, moral, ethical and religious codes. Participating students were divided into groups with similar themes. They were then given a series of exercises, which should be attempted with one of the group members' projects as a perimeter. Students were encouraged to rotate between projects for each exercise.

These are some of the exercises the student attempted over the two workshop cycles, with slight variances:

1. Stakeholder Mapping & Roleplaying
2. Negative brainstorming
3. Milton Glaser's Road to Designer Hell, with a discussion of "care" and "obligation"
4. Exploring moral ecology

Within this paper, the exercise Stakeholder Mapping & Roleplaying will be discussed in more detail. In viewing the student outcome, please bear in mind that the responses are a result of rapid in-class exercises, therefore they may contain inaccuracies or answers that are less measured.

The Stakeholder Mapping exercise has been used in design thinking workshops to identify key partners, audiences, improve team alignment and anticipate issues. Beyond that, stakeholder mapping can also be a map of power, influences and oppressions. In this workshop students map out stakeholders that have a vested interest in the decision making of the project, as well as those who may not have a voice, but are affected nonetheless. They are also required to include at least 20% of non-human stakeholders (eg. animals, objects, spaces etc.). This allows the consideration of the agency of non-humans in their projects. Figure 4 shows an example of a stakeholder mapping done by a group of four students, focusing on one of the group member's research projects.

The project selected by the group considers the challenges and experiences of children of single-parent families in Singapore. Currently, the notion of a family nucleus in Singapore is still based on a heterosexual married couple and their child/ children,

reinforced by policies such as public housing (Ong, 2000). There are government schemes directed towards supporting marriage and parenthood. The National Shared Values is an ideological framework that asserts "[f]amily as the basic unit of the society". Furthermore, in media discourses, images and descriptions of families often exclude people belonging to unconventional family structures.

As shown in figure 4, the students note the agency of non-human stakeholders such as places of leisure and the media have in the daily realities that treat people in single-parent families as "others".

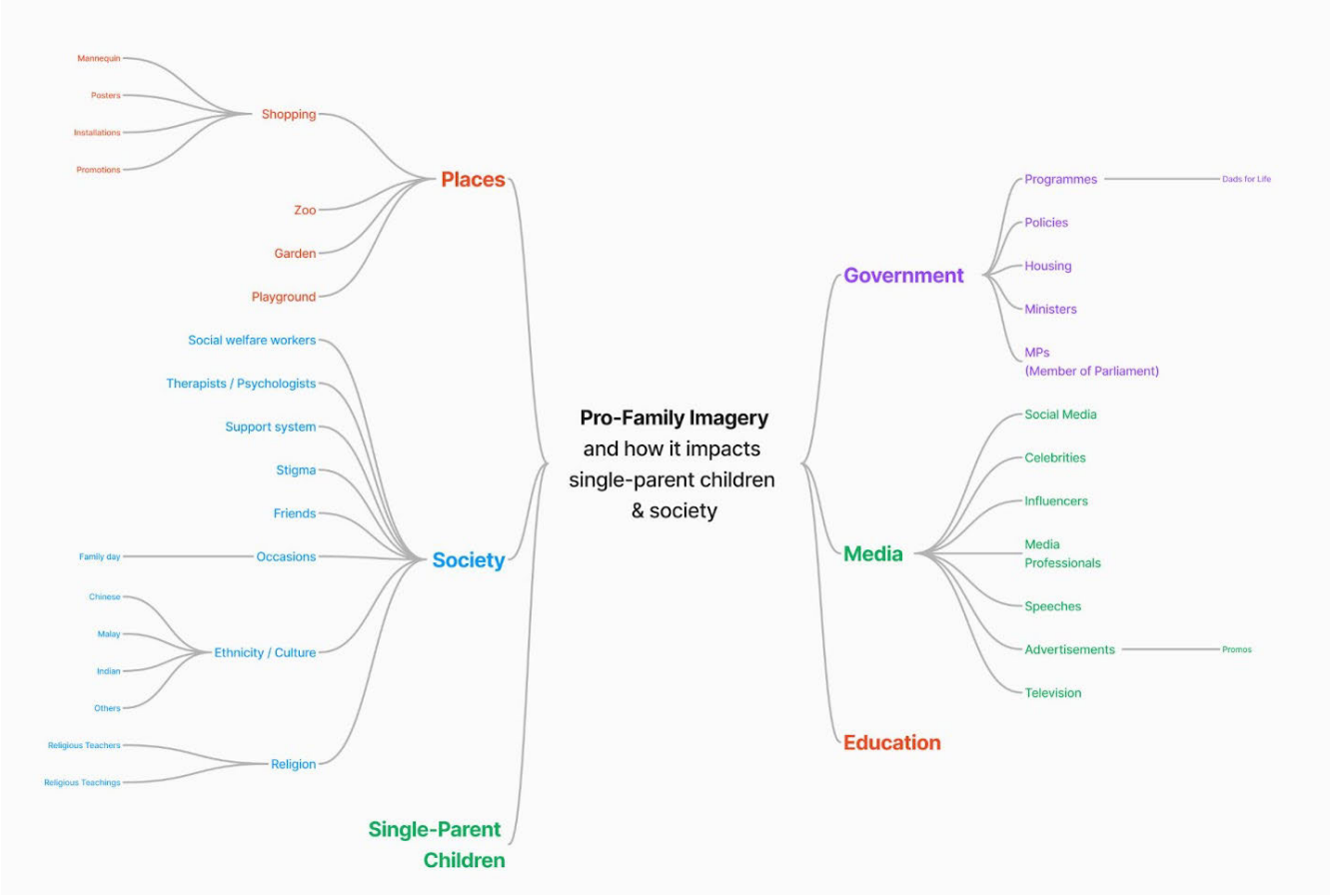

Figure 4: Outcome of one group of students attempting stakeholder mapping. This figure has been digitised and redacted for clarity as well as to remove sensitive information.

Afterwards, each student in the group is then invited to take on the role of one stakeholder, they were given a few moments to imagine "being in the skin" of this stakeholder, with some guiding questions to respond to:

- What are the changes that are taking place that are affecting you?
- How do you feel about these changes? Or the lack thereof?
- What are your wishes and needs for the future?
- What is your ideal future?
- How would you like to contribute to this ideal future?

Each student is then invited to present the stakeholder that they have chosen. They were encouraged to attempt to consider stakeholders that may have different value systems than themselves to begin understanding what different perspectives can look like. The written response of this role-playing exercise is shown in figure 5.

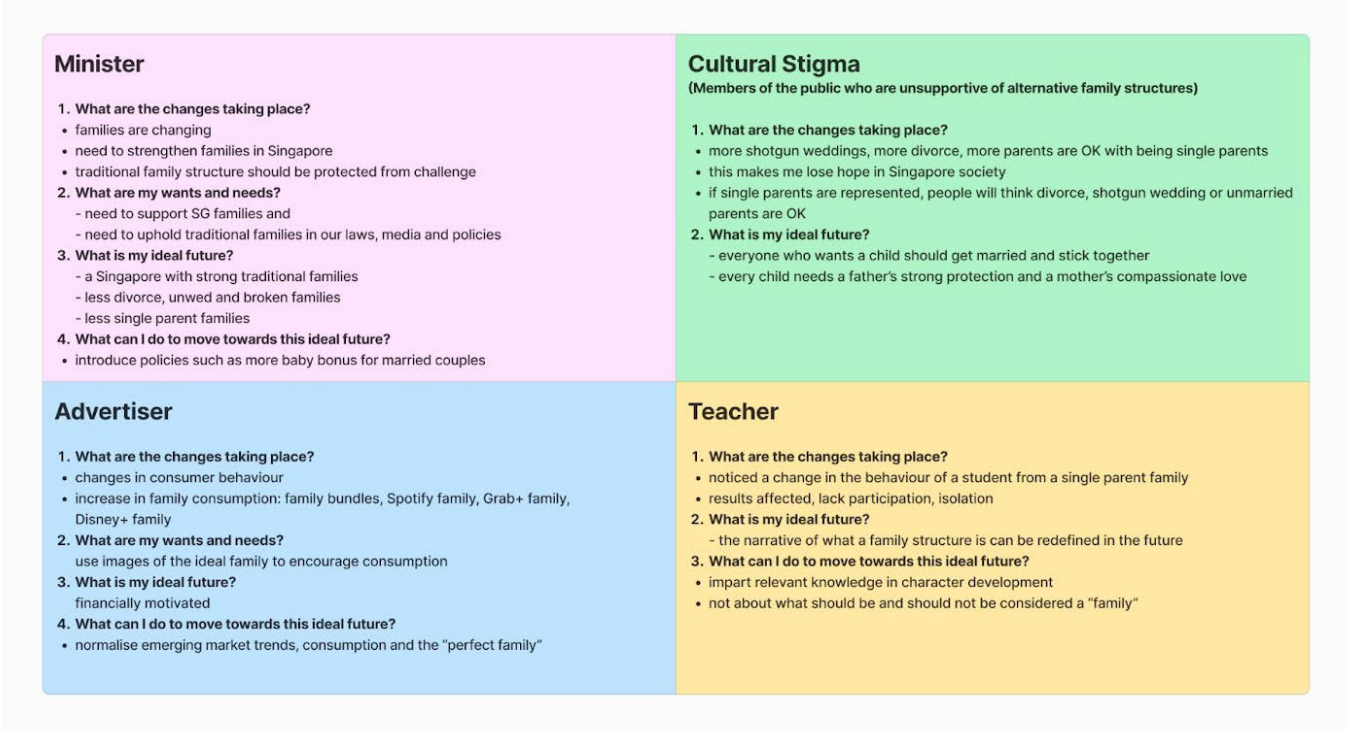

Figure 5: Outcome of students attempting stakeholder role playing for one of their groupmate's research projects. All personas are speculative. This figure has been digitised and redacted for clarity as well as to remove some sensitive information.

During the process of presenting and role playing their stakeholders, some students have difficulty empathising with a persona that is different from themselves. The fictive persona is a rough sketch of people whom they have encountered in person or through media. As such, even though it is a first step in empathising with others, the persona also reflects the students' experiences. It was emphasised during the session that this character sketch is hypothetical and could be followed up with more systematic studies.

Apart from engendering empathy, another way which this exercise becomes meaningful is in highlighting the different experiences and motivations from different subjectivities. In many of the projects discussed, design actions may benefit one group of people but negatively impact another. This ethical dilemma is often encountered in design, designer and researcher Anja Groten argues for more openness in this regard:

> "We have to stop convincing and become vulnerable. We have to present our work in ways that it can be attacked and open to the facts that our projects are partial, discriminating and flawed. Instead of asking: What are you designing? Or: Who do you design for?, we could ask: Who are you designing against? Which communities do you affect with your design?" (Groten, 2019, p.63)

3.4 Beyond the Workshop: Student Project Outcome

Beyond the brief workshop, students went on to complete their final year project and continued their engagements with design ethics. This section follows the work of a student, Lance Tan, who was part of the group that produced the Stakeholder Mapping and Roleplaying exercise featured above. The student had been guided by his graduation project supervisor, Yasser Suratman, whose graduation class focuses on "Design Advocacy and the Community", a framework with good opportunities for exploring design ethics. This paper does not imply a direct causal relationship between the Exploratory

Ethics workshop and the design students' final outcome, but is interested in the process by which a design student continues to tackle tricky ethics on their own merits.

The Lance's project, *I Grew Up Fine*, positions design as a social commentary on the representations of non-conventional families in Singapore's socio-political and media discourses. His outcome includes a public campaign, a microsite and a reimagination of a future family policy report that is inclusive to all families.

One main strategy is the appropriation of typical family imageries used in local mainstream media. These often depict the normative heterosexual couple family nucleus with a child (see figure 6). Upon a closer look a QR code leads to a microsite where the removal of the stereotypical family images reveals the textual description of a single-parent child's experience (see figure 7 & 8).

The act of being visible, especially in public spaces, can be both an assertion of one's right and a form of contestation to a hegemonic, exclusionary discourse. Images of non-conventional families, in particular positive representation of non-conventional families, are absent or minimal in Singapore. The project reflects a desire for the material appearance of the realities that have been othered, in quotidian public spaces. Furthermore, the "Singapore Family Plan 2030" component (see figure 9 & 10) reimagines a future where non-conventional families could one day become recognised in Singapore's public policies and national ideology.

Acting along one's moral ideals may put one at odds with societal norms and national ideals. *I Grew Up Fine* is one of the student projects that question the failures of utilitarianism. Ultimately, Lance's strategy to navigate this conundrum is to adopt a non-confrontational but hopeful tone.

Figure 6: *I Grew Up Fine*. This component is a public banner design installed around the public housing residential neighbourhood. There is a QR code amongst the photographs that lead to a microsite.

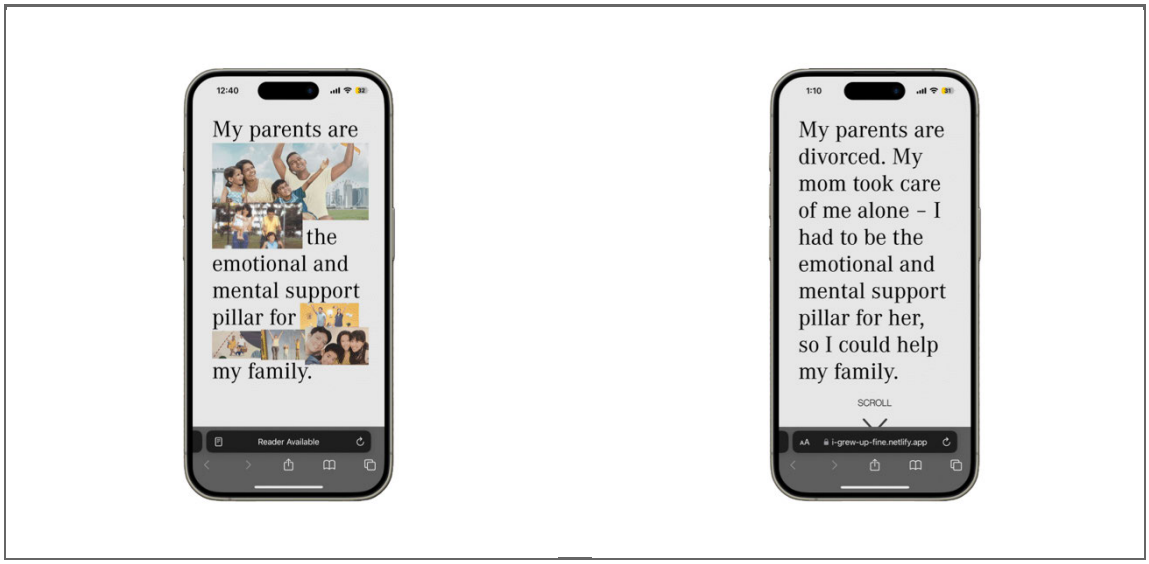

Figure 7 (left) & 8 (right): *I Grew Up Fine*. This component is a microsite that can be accessed by scanning a QR code from the printed banner in figure 6. Figure 8 shows an underlying message from the subjectivity of a member of a single-parent family.

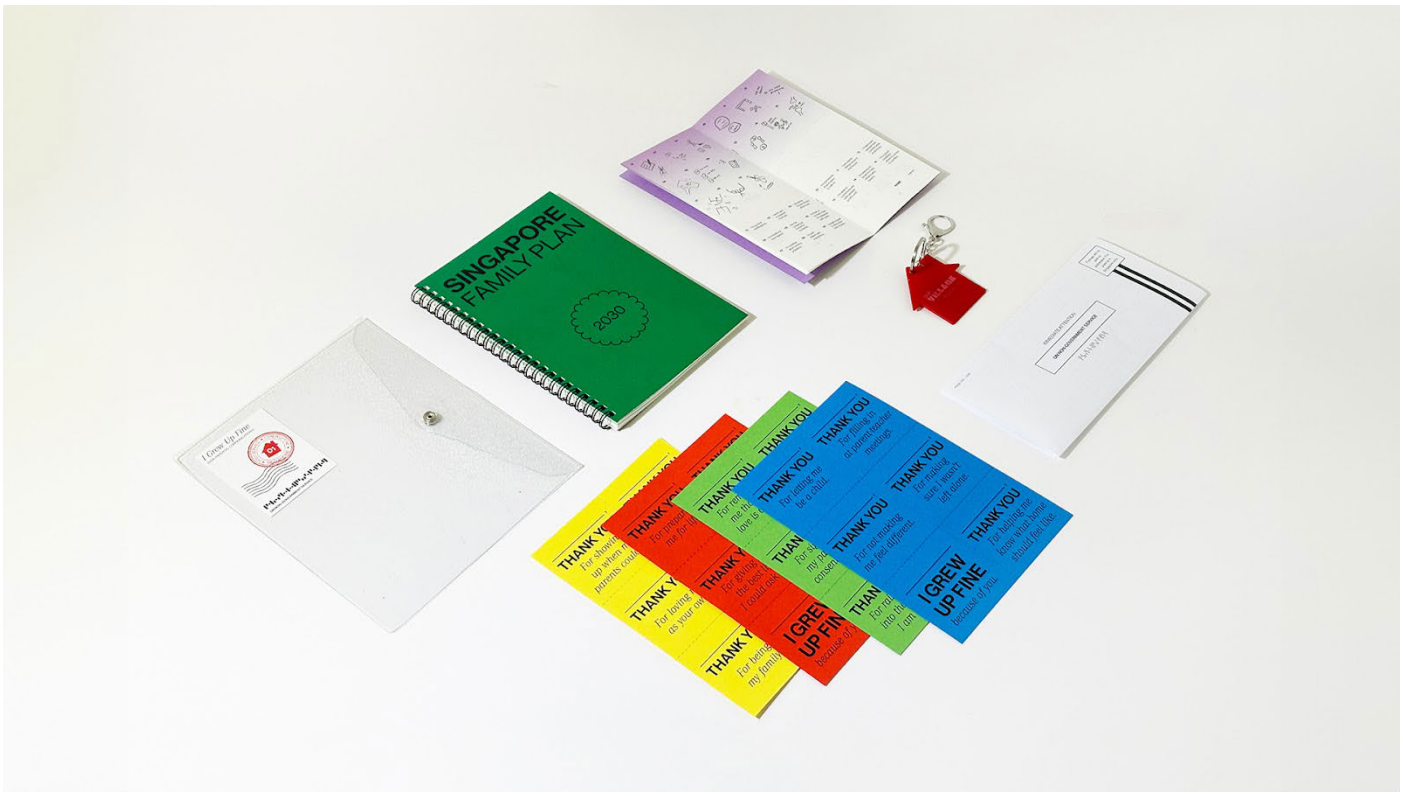

Figure 9: *I Grew Up Fine*. A speculative mailer kit designed for family related government strategy groups that reimagines a future where non-conventional families could become recognised in public policies and the society.

Figure 10: *I Grew Up Fine*. A spread from "Singapore Family Plan 2030", a speculative report that reimagines a future where non-conventional families could become recognised in public policies and the society.

4. Conclusion and Possible Future Directions

Developing ethical thinking in design practice is a long-term pursuit. Furthermore, knowledge on design ethics does not necessarily bring about certainties or closures but may at times lead to more questions as one's awareness of real-world complexities grows. A society's ethical values and norms are rarely homogeneous, but this can also lead to novel responses that are characterised by its context, as shown by the student project by Lance Tan that has been analysed in this paper.

The workshop format provides opportunities as it can be considered concurrently with other long-term modules. That said, the 3-session workshop format produced a time constraint. As students already had a significant workload outside the workshop, homework was also avoided, hence the current focus on ideation and presentation. Future iterations will focus on pedagogy and tools that integrate primitive making.

Beyond the three-week workshop, longer term connections need to be explored. This can come in the form of a longer module or simply connecting between different existing modules so that the learning points from the workshop can be utilised. However, at present not all educators are comfortable with discussing design ethics due to lack of expertise or interest. Hopefully design educational institutions continue to examine the balance between vocational and humanistic pedagogical interests in a period of rapid

global cultural and technological shifts that engender new ways of thinking about design practices.

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Guerrilla Information Battles: Publishing in Public Spaces

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ABSTRACT | Publics are associations of people – both physical crowds and virtual communities (Kelty, 2005; Taylor, 2004; Warner, 2002) – that are actively constructed and sustained through socio-material articulation (DiSalvo, 2009; Marres, 2007). A salient example of such a public-sustaining articulation is the largely unauthorized activity of publishing in public spaces through 'guerrilla tactics' such as graffiti, posters, banners, and stickering. As the Cumulus 2025 theme track *Informational Issues* seeks to critically investigate public engagement with published information in its many shapes and forms, the role of urban environments as dynamic and informal political bulletin boards should not be ignored. This working paper presents ongoing research into the built environment as an unofficial platform for political discourse. It draws on research into graffiti, posters, banners, and stickering as media to informally (and mostly illegally) publish political statements in public spaces, and comment on the political communications of others. Of these 'guerrilla publications' I have identified distinct types. I use the term *aesthetics of vandalism* to denote aesthetic experiences invoked by specific acts of mischief that target these unofficial publications. Moreover, this paper draws on three self-initiated workshops in which students were challenged to engage in political design (DiSalvo, 2012) through the creation of temporary, site-specific, monumental text installations in public spaces. These case studies explicate several challenges and opportunities workshop participants came across, as the cases render visible some of the 'designerly means and forms' participants implemented while seeking to engender public engagement with their political concerns.

KEYWORDS | PUBLIC ENGAGEMENT, GUERRILLA PUBLISHING, AESTHETICS OF VANDALISM

1. Introduction

In times of hyper-personalized and precisely targeted message content that is dispersed through lightning-fast and ephemeral digital media, one would almost forget the collective, pluriform, and omnidirectional bulletin board that is public space. A collective bulletin board, moreover, made up of mixed media that vary widely in their temporality, materialisation, and state of permanence. Instead of being informed by an ever-growing set of carefully harvested personal data, communications disseminated through public spaces are often targeted at unknown publics that consists of random passers-by. As I shall illustrate in this paper, the omnidirectional nature of these communications does not necessarily imply that the locations in which they are published are arbitrarily chosen.

In this article, the notion of public spaces refers to environments characterised by *various forms of 'publicness,'* both in terms of accessibility and as "spaces for encounters with difference" (De Magalhães, 2010, p. 562). Rotterdam is a good example of a city in which public spaces are actively used as an unofficial and informal communication platform. The city's building facades, infrastructure, and street furniture serve as a lively and dynamic bulletin board that facilitates the largely unauthorized activity of publishing in public spaces through 'guerrilla tactics' such as graffiti, posters, banners, and stickering. These 'guerrilla publications'[1] cover a wide variety of topical content, ranging from advertisements by small local businesses to content about Rotterdam's various subcultures and underground scene; and from communications supporting regional football clubs to unofficial statements that address political concerns. This paper focuses on the last of the above-mentioned categories, where I understand political concerns as circumstances that need *collective action* to change their current condition – a condition which is deemed problematic by a particular public (Dewey, 1927). Public engagement with these political problems and issues[2] is actively constructed and sustained through socio-material articulation (see, e.g., Kolks, 2023; 2024), and publishing in public spaces is a salient example of one of the many ways to do so.

Through guerrilla publications, the relative anonymity of Rotterdam's public spaces is being used to articulate a wide variety of (frequently conflicting) political concerns: from shaming "slum landlords" to warning against "5G hazards," from addressing the Israeli-Palestinian conflict to problematizing COVID-19 regulations, from supporting LGBTQIA+ emancipation to opposing gender self-identification, from promoting access to safe abortions to challenging fossil fuel industries, from articulating the discrimination of Uighurs to disputing the criminalisation of sex work (for a selection of these topics and how they are being articulated, see Figure 1). As such, the city of Rotterdam's lively guerrilla publishing culture appears to contradict sociologist Zygmunt Bauman's (2000, p. 60-61) suggestion that "public space is increasingly empty of public issues" as it "not much more than a giant screen on which private worries are projected without ceasing to be private or acquiring new collective qualities in the course of magnification." Contrary to Bauman's observations, Rotterdam's public spaces feature numerous guerrilla publications that articulate collective concerns rather than "private worries," be it often in *unobtrusive ways*.

[1] In the remainder of this paper, I will use this (inevitably reductionist) shorthand.
[2] Elsewhere (Kolks, 2023) – following scholars such as sociologist Noortje Marres (2007) – I describe the conceptual difference between problems and issues, and its important consequences for design discourse.

Figure 1. Rotterdam's public spaces are being used to articulate a wide variety of political concerns. Source: author.

2. Guerrilla publications fuel political engagement

Political guerrilla publications come in many media, shapes, and sizes. Although most of them are published using physical media, many connect to digital communication platforms via URLs, QR-codes, and hashtags. These communications are often materialised as modestly sized stickers and tags that easily go unnoticed, or as graffiti pieces created in lowkey locations such as highway underpasses. Political guerrilla publications, however, can also take on monumental sizes and grotesque forms. A notorious example in Rotterdam's recent history were the large-scale racist slogans – referring to white supremacy theories – that were laser-projected onto the city's iconic Erasmus bridge during New Year's Eve 2022 (NOS Nieuws, 2023).

Illegally projected onto the bridge's pillars from a nearby location, fragments of racist slogans were aired to a nationwide public via a live television broadcast that reported on the festivities around the bridge (RTL Nieuws, 2023). Further fuelled by posts on social media, these locally executed guerrilla publications had an impact on publics well beyond those spectators that witnessed them directly (Bir, 2023). Possibly encouraged by the controversy and media attention it caused, this specific 'guerrilla publication format' was later repeated in the cities of Alkmaar and Eindhoven, with similar slogans being projected onto the city halls of these municipalities (De Bekker, 2023; Polder, 2023).[3] As such, in an era vastly dominated by digitally mediated communications, guerrilla tactics of publishing in public spaces still show their worth as impactful forms of socio-material articulation that construct and sustain political engagement – for better, or for worse.

To identify specific ways in which guerrilla publications sustain public engagement and invoke aesthetic experiences, I have analysed an ever-expanding personal collection of photographs. When possible, I have selected examples written in English for this paper's figures to facilitate readability for an international audience. In what follows, I will first

[3] In February 2023 two suspects – members of the racist activist group White Lives Matter (Bir, 2023; Kraak, 2025) – were arrested for these activities (Polder, 2023). After being prosecuted for insulting a population group and incitement to discrimination, they were sentenced to six months in prison (Kraak, 2025).

describe ways to understand the communications and interactions mediated through guerrilla publications by relating them to social theory on public engagement. Next, I will home in on the specific subcategory of *political* guerrilla publications and the interactions they mediate by identifying several of these publications' distinct modes and varieties. Finally, I will present three self-initiated workshops in which I teamed up with design students to actively join the unofficial debates taking place in public spaces. In these workshops design students were challenged to address collective concerns through the creation of temporary, site-specific, monumental text installations in the public realm. Three workshops, moreover, that explicated both challenges and opportunities participating design students encountered when trying to engender public engagement with their political concerns through this specific form of publishing in public spaces.

3. Understanding public engagement

Publics are associations of people – both physical crowds and virtual communities (Kelty, 2005; Taylor, 2004; Warner, 2002) – that are actively constructed and sustained through socio-material articulation (Dewey, 1927; DiSalvo, 2009; Kolks, 2024; Marres, 2007). Social theorist Michael Warner (2002) argues that a public can consist of a well-defined group of people brought together by an occurrence at a physical space of assembly (e.g., a crowd at a party), but also of an ill-defined community of strangers – a virtual association of individuals, solely unified by their collective *attention to the same communication(s)*. Hence, publics are inherently *unstable* entities that only exist as long as they are actively sustained. To last, they "must continually predicate renewed attention" (Warner, 2002, p. 419). Correspondingly, guerrilla publications are socio-material articulations that seek to construct and sustain publics by catching and renewing their members' attention and interest.

Following scholars such as Dewey (1927) and Warner (2002), anthropologist Christopher Kelty (2005, p. 199) proposes three distinct types of publics: (1) an assembly of bodies (a crowd or an audience), (2) a "topical public" bound by its members' attention to specific communications (e.g., the persons reading this paper), and (3) a "meta-topical public" made up of individuals that imagine to participate in a particular discourse. While the first type of public depicts a relatively well-defined group of people, the latter two categories mostly represent ill-defined, virtual associations of individuals. As these three different types of publics are related to distinct circumstances, individuals are often involved in several publics simultaneously.

Therefore, within the same crowd attending the festivities around Rotterdam's Erasmus bridge on New Year's Eve 2022, some spectators ignored the laser-projected racist slogans while others actively paid attention to them – 'automatically' rendering this latter group a topical public. As some members of this topical public might additionally consider themselves participants in the discourse on discrimination and racism, this last subgroup of spectators – through different modes of participation and involvement – partook in three publics simultaneously: a crowd attending New Year's Eve festivities, a topical public, and a meta-topical public. While the New Year's Eve crowd fell apart when festivities around the Erasmus bridge ended, the topical public that came into existence that very day only ceases to exist when people stop paying attention to that night's racist laser projections, just like the meta-topical public on discrimination and racism only disintegrates when its members no longer imagine themselves partaking in its discourse.

Most of the political guerrilla publications described in this paper are not intended to be crowd-pulling events in themselves. Instead, they rather seek to sustain the engagement

of topical and meta-topical publics. As we shall learn in what follows, the transient nature of most guerrilla publications – as well as their often flimsy materialisation – can actually be valuable communicative assets that specifically support their aesthetic appeal.

4. Variations in spontaneity and situatedness

Within public spaces, guerrilla publications are published on platforms such as facades, infrastructure, and street furniture, using media like stickers, posters, the ink of felt-tip pens, or spray paint. While some are one-off manifestations, others are serially produced. Consequently, as some might be the direct creative result of individual spontaneity, others explicitly require forethought, planning, pre-production, and/or outsourcing. Moreover, where some serially produced guerrilla publications are stand-alone entities, others are individual components of (unofficial) overarching campaigns (Figure 2).

Figure 2. One-off publications versus serially produced items, individual entities versus campaign components. Source: author.

Guerrilla publications vary in their degree of situatedness. While some seem arbitrarily positioned within – or randomly distributed throughout – the urban landscape, others explicitly relate to their specific context. Within this latter category, location-specific and contextual elements can intensify both the communication's appearance and meaning. Guerrilla publications can accomplish this via (1) physical interventions that comment on the specific content of other actors' statements in public spaces, for example through *subvertising*[4] (Figure 3). They can also intensify their communicative capacities by (2) tuning their content in to meanings associated with their physical surroundings, or (3) by incorporating elements from their physical location as form components (Figure 3, right).

Figure 3. Contextual elements that intensify guerrilla publications' meaning and appearance. From the left: (1) Location-specific *subvertising* via a billboard that advertises luxury apartments. (2 & 3) The added stickers read "Unaffordable Rotterdam – Stop market forces – Housing is a fundamental right" and "Rotterdam. Is it happening?" (a pun on the city's marketing slogan "Rotterdam. Make it Happen"). (4) A location-specific physical element incorporated as a form component. Source: author.

[4] Writer Mark Dery (1991) coined the term "subvertising" to describe the production and dissemination of anti-advertisements, often through illegal material interventions (see also Dekeyser, 2021).

5. Aesthetics of vandalism

One can identify specific ways in which guerrilla publications invoke aesthetic experiences. I understand "aesthetic experiences" as *conditions of intensified attention* in which perceptions and/or interactions promote curiosity, engagement, and/or imagination (Petersen et al., 2004; Ross & Wensveen, 2010). Thus, aesthetic experiences go well beyond encountering pleasure and beauty (Folkmann, 2023; Koren, 2010) as (for example) puzzling, frightening, or repulsive sensory stimuli can also trigger curiosity, engagement, and the imagination. Moreover, instead of regarding aesthetics *intrinsic* features of specific artefacts or conditions, I consider aesthetic experiences to be individually constructed through interactions (Dewey, 1958) that are both informed by biological (Ware, 2022) and sociocultural factors (see, e.g., Folkmann, 2023).

I use the phrase *aesthetics of vandalism* as an umbrella term to describe the ways in which the *violation* of guerrilla publications through specific acts of mischief invokes aesthetic experiences. Acts of vandalism such as tearing away, scratching out, or covering up other actors' guerrilla publications can bring about "attentional tuning" to those communications (Ware, 2022, p. 52), as the results of these actions can promote curiosity and spark the imagination regarding the political articulations that were removed, damaged, or obscured. Rotterdam's public spaces host several examples of guerrilla publications that have been cancelled[5] by other guerrilla publications that carry opposing messages. Interestingly, the very act of cancelling can *intensify* attentional tuning to the controversy that is being addressed by *both* publishing parties and unintentionally solicit curiosity to the (literally) underlying perspective in particular (Figure 4). Just like David Carson defends his experimental graphic design work by stating that one should not confuse legibility with communication (Blackwell, 2000), the aesthetic appeal of these vandalised, partly legible, guerrilla publications is increased by the extra effort publics must invest to make sense of their content (see, e.g., Hekkert, 2006).

Figure 4. Aesthetics of vandalism: specific acts of mischief invoke aesthetic experiences. From the left: (1) scratching out, (2 & 3) tearing away, and (4) cancelling. Source: author.

6. Students engaging in political design

After describing and analysing other actors' guerrilla publications, I will use the final part of this paper to share some of my own educational experiences with publishing political concerns in public spaces. Design scholar Carl DiSalvo (2012) uses the term "political design" to denote designed artefacts that support societal conditions of ongoing

[5] I understand *cancelling* as the deliberate attempt to obliterate and/or neutralize the force, effectiveness, and/or validity of a communication (see, e.g., Merriam-Webster, n.d.).

opposition, contest, and engagement with political concerns through "designerly means and forms" implemented *outside* the realm of institutional politics. As part of an ongoing research into the built environment as an unofficial platform for political discourse, I initiated three workshops that challenged design students to engage in political design through the materialisation of a temporary, site-specific, monumental text installation in public space. These workshops sought to investigate which pressing collective issues participating students were eager to make public, and which designerly means and forms they would use to engage unknown topical publics (made up of random passers-by) with these political concerns.

The end results of all three workshops were executed at locations with relatively high volumes of traffic passing by. However, the workshops varied in their duration, location, and possibilities for students to co-design physical outcomes. The first workshop was a one-day event executed in the city of Breda. Design students were asked to collectively decide upon a text that would be published on a premanufactured framework situated near a busy road (Figure 5, left). This workshop's brief prescribed that the text installation should address a political concern inspired by a news item published on the same day the workshop took place (4 October 2018). The second workshop ran the following year, this time executed in a vacant interior space at Breda's central railway station. Its less restrictive brief, week-long duration, and higher material budget gave students more possibilities to co-design the overall manifestation of the workshop's outcome (Figure 5, centre). The third workshop took place in the city of Den Bosch in 2022; lasted one week; featured an open design brief; and used pre-existing rooftop frames on abandoned buildings near the central railway station as publishing structures (Figure 5, right).

Figure 5. Publishing in public spaces, workshop results. From the left, the signs read: (1) "sharing supposedly is the new having," (2) "reacting endlessly - hoping for a reply" and (3) "on & on." Source: author.

In the first workshop, participating design students had to exclusively work with text. As most participants were more used to engage with sensory-oriented design projects, this proved to be challenging – especially within the constraints of a pre-designed output format. Although numerous statements were produced, the phrasing was often rather straightforward, lacking much associative depth, and leaving little room for interpretation. Moreover, the assignment to address public issues was often ignored as many texts articulated private problems rather than collective concerns. Conversations with participants suggested that a key factor contributing to these results was that students insufficiently *imagined* the publics they aimed to address. They also tended to overlook the influence of site-specific conditions on the formation, composition, and attention span of these publics. The following workshops were therefore set up in such ways that more time was allocated to practice articulating public issues through the medium of text, map specific aspects of the unknown topical publics students sought to address, and allow participants more space to (co-)design the workshops' physical output.

7. Articulating political concerns through designerly means and forms

The second and third workshop's briefs urged participants to consider the formative impact of site-specific circumstances when developing their design proposals, such as variations in velocity and viewpoints provided by different transport modalities passing by the text installation. Moreover, participants were encouraged to vividly imagine the topical publics they aimed to address and empathize with their diverse members' lived experiences. Although both workshops saw participants again struggle with writing evocative texts, private problems were now mostly shunned in favour of collective concerns. Also, more text proposals were indeed being informed by location-specific considerations (e.g. differences between a site's day- and nightlife) and empathy with the varied and ill-defined community of strangers that participants sought to engage.

Thematically, the installations that came out of both workshops articulated social pressures perceived by participants about having to continuously react to an overload of incentives from their physical and virtual surroundings. In contrast to the slow writing phase, participating design students enthusiastically explored the communicative capacities of form, experimenting with sensory and interactive aspects. They incorporated site-specific conditions and strategically considered the deployment of spatial elements, materials, colours, and lighting to intensify the installation's communicative capacities and engender attentional tuning (Ware, 2022) to its political content. In their final designs, participants sought to provoke engagement through curiosity rather than communicative clarity. By intentionally playing with legibility, and by disclosing content information piecemeal, publics were challenged to cognitively invest in making sense of these text installations. To increase their aesthetic appeal through subtle interactions, passers-by had to mentally stitch together letters, words, and characters that were spatially dispersed (Figure 5, right) or read a text fragment via a mirror (Figure 5, centre). In short, instead of opting for straightforward legibility (figure 5, left), workshop participants used designerly means (their aesthetic sensitivity to form and interaction) to translate the social anxieties they perceived into carefully staged *efforts* that publics had to make to both experience and understand the text installations' content and meaning.

8. Conclusion

In this paper I have described how the activity of publishing in public spaces through 'guerrilla tactics' such as graffiti, posters, banners, and stickering have transformed Rotterdam's public spaces into unofficial political bulletin boards. Of these "guerrilla publications" I have identified distinct types and used the term *aesthetics of vandalism* to denote aesthetic experiences invoked by specific acts of mischief that target these unauthorised publications. I have described three self-initiated workshops that can be considered attempts to engage in political design and design activism, as they evoke "revelation, contest, and dissensus" through "aesthetic means and expression" that alter "the condition for urban experience" (Markussen, 2012, p. 50). These workshops explicated some challenges and opportunities that participating design students came across, while also rendering visible the "designerly means and forms" (DiSalvo, 2012) participants implemented when articulating their political concerns through collectively designed public text installations. To support the ongoing political discourse in public spaces, I will add my own guerrilla publication to Rotterdam's urban landscape: a custom-designed sticker with a QR-code that directs readers to an online version of this paper.

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HYPERREAL CONSUMPTION: HOW SOCIAL MEDIA SHAPES MOTHERS' PRODUCT DECISIONS.

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ABSTRACT | This study aims to evaluate how influencer marketing activities resonate with the needs of contemporary individuals who possess a lifestyle informed by hyperreality through Baudrillard's perspective. To understand this effect, a case study focuses on mothers who seek product and childcare advice via Instagram, a widely used social media platform. In the first stage, in-depth interviews were conducted with participants who follow influencers on Instagram. These interviews were analysed regarding consumers' approach to influencers and product acquisition from promotions. The analysis revealed trust in influencers and that users were often influenced to buy many products with meanings beyond their functional use. In the next phase, a survey will be conducted among mothers who do not follow the influencers to evaluate insights gained from a broad audience. As a result of these analyses, the study aims to understand the factors influencing users' product purchasing preferences and the impact of these promotions on individuals. This understanding will lead to recommendations from a designer's perspective regarding product-user interaction. Thus, in line with changing communication forms, it will facilitate the shaping of collaboration between designers and marketers, creating an environment that better meets user needs.

KEYWORDS | SOCIAL MEDIA, INFLUENCER MARKETING, PRODUCT MEANING, USER NEEDS

1. Introduction

This study examines the role of influencer ads in Instagram users' need identification and product acquisition processes. As a case study, mothers who are Instagram users with babies were taken in the supplementary food process. The study will detail users' product perception and evaluation processes following mother-baby-themed Instagram influencers.

The proliferation of social media has led to significant changes in consumption habits and marketing strategies. Influencers with a sizeable following influence their followers by promoting products with their experiences on social media platforms. These individuals make product recommendations and give their followers the feeling of using them.

Social media's practical and continuous use has become essential in shaping consumers' purchasing decisions. Consumers now research the experiences of individuals who have previously used a product before purchasing it and make decisions accordingly. In this context, brands are moving away from classical promotion methods and prefer cooperating with influencers who have already experienced and recommended their products.

In the contemporary post-truth period, emotional and belief-based arguments shape individuals' perceptions of knowledge and reality. Baudrillard (2023a) defines today's human being as a consumer society individual with a lifestyle that gains meaning only through motivated needs. In this context, users' exposure to influencer ads does not only mean seeing a product; it also allows consumers to recognize their own needs and choose products that meet those needs. In this process, emotional ties and popular beliefs play a decisive role in individuals' purchasing decisions.

Especially in sensitive issues such as baby feeding, the reliability and scientific basis of products are crucial. Since mothers often view influencers' recommendations as reliable, promotions with misleading or incomplete information may pose risks. However, the perceived honesty of influencers through the world they construct may be misinterpreted by audiences evaluating the product’s role in that lifestyle, leading to unnecessary consumption and unrealistic expectations. Therefore, protecting vulnerable consumer groups and ensuring transparent information are key elements within the ethical framework of influencer advertising.

In line with the interdisciplinary nature of the study, design methods such as user-centered inquiry and scenario-based evaluation were integrated into the research. These methods helped analyze how and why users engage with products in specific everyday contexts, rather than merely what they consume.

2. Background

Jean Baudrillard's views on consumption, which are the source of this study's theoretical framework, shed light on Influencer culture and consumption habits influenced by this culture. In his book Simulacra and Simulation, Baudrillard argued that reality consists of an illusion and that copies behave like originals. At the same time, he argued that our postmodern age has lost its reality, and artificiality prevails in today's world (Baudrillard, 2023b).

According to Baudrillard (2023b), simulacra is an appearance that wants to be perceived as reality; simulating presents the unreal as accurate; and simulation is the artificial reproduction of a phenomenon. Baudrillard argues that simulacra reflects reality, conceals it, and finally reaches a hyperreality that has nothing to do with reality. Hyperreality is the derivation of reality through models and makes objective reality questionable.

In the postmodern age, it enters a new subjectivity in the universe of simulacra created by the media or mass media. Signs and images determine the subjectivity in question here. These images and signs constitute individuals' happiness/unhappiness and satisfaction/dissatisfaction (Şaylan, 2009).

According to Baudrillard (2023b), the individual's universe becomes an imitation (simulacra network) of the reality determined by the media or television. Models, images and codes of hyperreality begin to guide thought and behaviour. The end of the spectacle brings with it the transformation of reality into hyperreality and the careful copying of reality, primarily through other means of reproduction, such as advertising or photography (Baudrillard, 2021).

Instead of witnessing an imitation or copy indistinguishably similar to the original, we see that the line between the original situation and the imitation disappears. In this case, there is no difference between the real and its representation. The only thing that remains is a simulacra. In this world where everything is imaginary, the absence of reality evokes hyperreality (Baudrillard, 2023b).

The concept of consumption is traditionally based on the notion of need. However, in our current period, concepts such as desires, pleasures and status have prioritised consumption; consumption has moved away from use value and need and turned into a sign value. Baudrillard (2023a) emphasises that objects outlived human lifespans in the past, but today, the lifespans of rapidly produced and consumed objects have shortened. The consumer's relationship with the object has been transformed. Consumption has become the primary goal of individuals, and under the pressure of their habits, individuals have lost their ability to think critically.

In his first book, “The System of Objects/Le système des objets”, Baudrillard demonstrated how alienation can be understood through different semiotic dynamics. In the system of objects, it can be said that elements such as personalisation, pressure to differentiate, dissemination of elements of secondary importance, associating the technological structure only with production and consumption, making it dysfunctional, and the transformation of the system into a unique structure through advertising are prominent. In this context, it is possible to state that the system has become unique and structuralised under the influence of advertising (Baudrillard, 2020). Apart from the function and necessity of purchasing the product, acquiring the product through the scenario the system establishes for the user is emphasised.

According to Baudrillard (2020), advertising is an ideal representation of the system of things, an entire of powerful symbols and has become the source of the most accurate information about consumption. Advertising is based on a fairy tale that is believed rather than on evidence and promises. The product can be consumed physically, but its meaning is grasped through advertising. In this study, Baudrillard's advertisement is discussed in the context of social media advertising.
Influencers shape buyer decisions through their perceived honesty and the world they

create. Trust, rooted in perceived honesty, integrity, and expertise, is key to influencer marketing. Greater trust enhances the persuasiveness of endorsements, making it a fundamental aspect of influencer marketing theory (Chu & Kamal, 2008).
A key ethical question for influencer marketing practitioners concerns the disclosure or non-disclosure of the influencer's financial interests, i.e. the person communicating about a particular brand, product or service. Wellman Stoldt, Tully and Ekdale note that the ethical principles guiding sponsored content production are poorly understood (2020, p. 68). In many cases, influencers hesitate to disclose the commercial nature of their relationship with the marketer because they fear losing close relationships with their followers.

Influencers attract followers through personal communications based on values such as authenticity and honesty; as such, the disclosure of a sponsorship harms the influencer's credibility (Veirman & Hudders, 2020, p.1). Many users are annoyed and confused by sponsored posts integrated into various social media content, which can ultimately harm their reactions to sponsored posts (Stubb & Nyström, 2019, p.110). Despite the risk to influencer-follower trust, disclosing financial arrangements ethically justifies sponsored content on social media.

3. Methodology

This study examines the product perceptions formed by influencer advertisements and the experiences of using these products in daily life. The research, which is evaluated through mothers whose babies are in the process of supplementary food, addresses the impact of the lifestyle that influencers offer with the products they promote on user perception. It aims to discuss product acquisition motivations, expectation-reality differences, and the impact of long-term use on daily routines.

The study was designed in 3 stages. In the first stage, as a pioneering study, in-depth interviews were conducted to determine the consumers' view of influencers so that the study was based on a foundation by making sense of the relationship between consumers and influencers. In this context, in-depth interviews were conducted with 4 participants, and the qualitative content analysis method was used for data analysis. Qualitative content analysis is a method used to systematically define the meaning of qualitative material (Schreier, 2012, p.1). The material obtained as a result of the research is classified as examples of the categories of a coding framework. From the data from in-depth interviews, themes were created and analysed in line with mothers' relationships with the mother-baby product advertisements made by influencers. The interview analysis revealed how influencer marketing efforts affect the mothers' process of acquiring baby care products.

The themes that emerged from the analysis are **reasons for trusting influencers**, **expectations about the influencer role**, **the effects of influencer ads on participants**, and **practical and expected influencer ad formats**.

- **Reasons for trusting influencers:** The first of the prominent topics in the responses of the participants regarding the reasons why they find mother-baby influencers trustworthy was coded as “sharing experiences”. By documenting their time with their children, influencer moms inspire others and connect with other moms in similar situations.

  “At the same time, I am going through the same things, and even, let us say, I am

about to give birth, but the person on Instagram's baby is 6 months old; I looked at her posts from 6 months ago. What she has been through. So she is experienced. She instantly shares what she does with her baby; she has the same impulse as me. How she cares for her baby at home is attractive to people."

The other codes in this category were analysed under "sharing the daily routine" and "naturalness and natural environment".

"Full make-up and well-groomed influencers do not feel sincere at some point; being in a natural environment is meaningful. At some point in motherhood, it is impossible to be well-groomed and make-up because I experience it."

- **Expectations about the influencer role:** Another category that emerged from the participant's responses were the participants' emphasis on the influencer role. Among the subcategories that emerged, the striking ones were "showing the relationship of the promoted products with the child and its environment" and "the influencer being honest and natural". When Instamoms advertise honestly, the disappointment afterwards will be minimised if a purchase is made about the promoted product.

  "They have to be honest, which is a matter of conscience. We are not a normal segment. We are a needy segment. We buy a product out of desperation. Honesty and sincerity are essential. Otherwise, it is not sustainable."

  Participants are a group that identifies themselves as helpless, which may be due to the difficulties and inexperience they have with baby care. At this point, the honesty of the influencer may be an important factor for mothers to meet their expectations from the products they purchase through Influencers.

  Product advertisements that are far from the natural environment and do not include scenes of interaction with children cause consumers to distrust the product being promoted.

  "I do not like overly sterile environments and product-oriented displays in commercials. I think an environment with children is always messy. Despite this, showing a car seat in a spotlessly clean car in commercials is not convincing. I think it is not used in reality because our car seat is full of crumbs between the seams. So I question whether it is recommended based on experience."

- **The effects of influencer ads on participants:** The analysis of the impact of influencer promotions on participants reveals a negative picture. The subcategories that emerged are "feeling of inadequacy" and "attributing meaning to products". Participants reported that following influencers created a feeling of inadequacy.

  "The thing that affects me the most is food. Some influencers prepare a wide variety of meals for their children and put it in front of them, and they eat it all. Then, when my child does not eat it, it makes me feel that I cannot present it or feed my child."

  Advertisements manipulate a situation that mothers can easily manage with

instinct or what they know through products. The feeling of inadequacy may make mothers feel obliged to do and try different product options for tasks they find difficult to do.

Influencers' product promotions cause the participants to attribute meaning to the products and evaluate their instant situation through the product.

"For example, a pacifier that glows at night and one inserted with a finger. I bought many pacifiers, but it did not work. It is thought that the pacifier is the trick. Nevertheless, the child will not take it. You want the product to achieve this."

- **Practical and expected influencer ad formats:** When the participants' expectations from influencer promotions were analysed, the subcategories of "influencers being honest," "conveying all the positive and negative aspects of the products they promote," and "sharing long-term experiences about the products" emerged.

  In product use, influencers are expected to know the scenarios and honestly reveal the entire flow.

  "For example, a bib filled with leftover food. The advertisement's argument is very nice; all the leftover food goes inside, but there is no aftermath. I found it very difficult to clean. I found it restrictive, and I do not use it. The whole story is important".

  Here, scenarios frequently used in the design process should be considered in the product promotion fiction.

The first phase of the study focused only on mothers who follow influencers. When the results were evaluated, it was considered appropriate to compare the participants who follow influencers and those who do not follow influencers in identifying needs and making product decisions.

In the second stage of the study, based on the results of the in-depth interview, which is the first stage, a survey study is planned to obtain the opinion of a wider audience and determine the target audience of the focused study. In the survey, mothers who follow and do not follow influencers will be reached, and their approaches to product selection will be revealed.

The data from the survey, will be used as a semi-structured interview setup, which is the final stage of the study. The data planned to be obtained from the second stage of the study design is determined as the customisation of the target audience to be focused on and the determination of the products that consumers specifically purchase for the supplementary food period through influencer advertisements.

In the third stage, in-depth interviews will be conducted with participants selected from the target group. These interviews aim to compare the preferences of those who buy products by following influencers on Instagram during the supplementary food process and those who do not follow influencers. The data targeted to be obtained includes the reasons for following influencers, the process of identifying needs, the products purchased and their alternatives, other products used for the same function, and the motivations for storing or sharing products when they expire.

4. Conclusion

The rise of digital platforms in the hyper-reality era has diversified the ways in which influencers interact. Social media platforms such as Instagram, which is the focus of this study, have changed the way products are marketed and the habits of consumers with their increasingly diverse content delivery. This development and transformation have also led to scepticism towards influencer marketing. De Veirman and Hudders (2020, p.25) argue that influencer marketing faces more authenticity and transparency issues and may need innovative strategies to maintain consumer trust.

The Instagram user who follows the mother-baby influencers, taken as a case study in the study, sees and passes by the images shared in the hyperreality defined by Baudrillard. Mothers either encounter a miracle for a complex subject or define a need. These evaluations are instantaneous and do not require long and hard work. At this point, the distinction between the real need and which need is based on the media disappears, leaving only the simulacra.

When data on whether the usage experience of products obtained through influencer advertisements overlaps with the contribution mothers expect to their routines is evaluated, the product encountered via influencers may yield a different result in real life. The tale presented in hyperreality through Instagram may not always match reality. Misleading content and misperception of product function or necessity are possible. What mothers perceive as real may not be objective reality; influencer promotions can mislead inexperienced mothers and lead to overconsumption by encouraging them to buy more products than needed.

This study examines the effects of influencer marketing on product experience, with a focus on baby care products. It examines the influencers' product promotion in terms of the impact of the products on the user. In this way, it aims to reveal the difference between the users' expectations of the product and the designers' design purpose in this contemporary period called Post-truth.

Based on these findings, the study contributes to design practice by emphasizing the importance of aligning product narratives with real user needs and experiences. Design plays a critical role in ethically navigating the blurred boundaries between perceived and actual product value, especially in emotionally sensitive domains such as baby care.

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Information Design for Change in Public Sector. Methods to Decode Complexity for Policy and Decision-Making.

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ABSTRACT | In public sector communication aimed at engaging citizens in participatory processes, service design promotes the entry of designers in facilitating foresight activities (Kimbell & Vesnic-Alujevic, 2020) to co-design public policies. In imagining future scenarios, the text becomes a "place of engagement" (Pasa & Sinni, 2024) to understand regulations and rights that underpins effective participation (Perry-Kessaris, 2019). Leaders have always been recognized for their visualization skills (Mirzoeff, 2015), and today managers can use more visual techniques to coordinate strategic changes (Perondi, 2022; Berger-Walliser et al., 2016). The ongoing research investigates whether public communication can be made more efficient by introducing methods of visualization (Hill & Lachenmeier, 2022), which can be traced back to 'inscriptive practices' (Lucas, 2020) and to 'graphicacy' (Balchin & Coleman, 1966), the ability to communicate and understand through visual artifacts. At the methodological level, the first step will compare two national contexts and explore legal writing practices through desk analysis. Subsequently, local case studies of foresight-based participation will be researched, and criticalities and opportunities identified through in-depth interviews and surveys. Prototypes of visual information facilitation will then be defined and tested in co-design sessions. The expected outcome is a method consisting of techniques and activities that can be shaped into a curriculum to train decision making skills through visualisation, both for designers and public sector operators.

KEYWORDS | PUBLIC SECTOR, PUBLIC COMMUNICATION, DECISION-MAKING, INFORMATION DESIGN, LEGAL DESIGN

1. Introduction

The rise of the information-based 'network society' impacts communication and engagement between people and organisations (Papini, 2014; Castells, 2014). The “infosphere” (Floridi, 2023) led to a general shortening of the attention span (Simon, 1971), while digitisation and servitisation have created an invisible infrastructure that hinders understanding (Downe, 2023), affects decision-making (Giorello & Donghi, 2019) and definitely endangers democracy (Cassese, 2014; Sartori, 2023).

Approaching the phenomenon from a interactional perspective, communication between people and organisations - or between people within organisations - takes place through the transmission and understanding of information (McLuhan, 1967; Floridi, 2024), generally mediated by the production of written documents, where the text becomes a "place of engagement" (Pasa & Sinni, 2024). However, organisations often do not have the time to engage with all the information (Aricò, 2024), and this risks undermining effective understanding of the regulations and rights that underpin effective participation (Perry-Kessaris, 2019).

One of the organisations that most permeates a person's life through communication is the public sector (Cammelli, 2014), which is also an organisation that is increasingly adopting design to support communication and foster change (Buchanan, 1992; Kimbell, 2019; Mager & Davis, 2024). In particular, the entry of service designers into the public sector is due to the ability of designers to ‘overcome the limits of words’ and to propose visual solutions that facilitate communication (Mager & Davis, 2024). Leaders have always been recognised for their visualisation skills (Mirzoeff, 2015), and today managers in different areas of the public sector can use visual techniques to coordinate strategic changes and make sense of the status quo (Aricò, 2024; Perondi, 2022; Berger-Walliser et al., 2016).

Considering that visual communication underpins the design of strategies such as laws and policies (Buchanan, 1992), and that change and decision making needs to be informed by a good understanding (Ducato & Rossi, 2024), the research aims firstly to study the current state of public communication and public engagement, in order to investigate than the performative, contextual and time-related impact of information design techniques in service design practices, with the aim of defining a method that allows decoding and facilitation of discourses conducted in a real-time collaborative context.

2. Scientific Framework

In the public sector, public communication is the discipline that addresses how the State can communicate to staff and citizens through the operators of the public administration, using methods and techniques of public engagement (Lovari & Ducci, 2019). Rolando (2018) visualises the Italian public administration

as a "building", dividing its activities into floors: the ground floor is about laws and regulations, where the government acts through the legislative offices to explain "to itself" - and then to its staff and citizens - who it is, what it does and what its powers are; while the fifth floor is about policy-making and it is related to public debate, participatory processes and to “the maintenance of the democratic aspiration for change”.

In the change of public communication caused by the information age (Lovari & Ducci, 2019), design contributes in various ways to support the public sector. Municipalities use foresight and anticipatory techniques to co-design policies with policy-makers and citizens during in-presence workshops (Apolloni, 2021; Kimbell & Vesnic-Alujevic 2020). The platform gov.uk (UK Government, 2024) strengthens the relationship between citizens and government, through the work of service, visual, content and interaction designers. The model is contextualised in Italy by Designers Italia (2024), in a wide movement that can be seen as a reconstitution of ‘graphic of public utility’ (Sinni, 2018). Recently, design has attracted the interest of lawyers, giving rise to Legal Design (Hagan, 2020; Perry-Kessaris, 2019), a community exploring the role of design in legal practice and policy-making, that seeks for a robust methodology in policy prototyping, concept mapping and visualisation (Hagan, 2020; Berger-Walliser et al., 2016).

These trends respond to the international interest in more transparent institutions, as confirmed by specific points of the Sustainable Development Goals (SDGs) (United Nations, 2015): in SDG 16 'Peace, Justice and Strong Institutions', is asked to supporting effective and transparent institutions (16.6), by ensuring participatory and open decision-making processes (16.7) and access to information (16.10); in SDG 17 ‘Partnership for the Goals’, is asked to promote the role of public sector as an “honest mediator”, ensuring clear direction to all other actors involved in the change process. Moreover, the three pillars to shape 'the democracy of the future' identified in the report 'The Future of Government 2030+. A Citizen Centric Perspective on New Government Models' (Vesnic-Alujevic et al., 2020) are design, foresight and citizen engagement.

Within the international regulatory framework, the guidelines of the EU AI Act (European Commission, 2024) require accessibility, transparency and accountability of information systems. In the Italian context, the adoption of the Italian Transparency Code for Public Administrations, introduced by the Anti-Corruption Law of 2013, the Freedom of Information Act (FOIA), introduced by Legislative Decree No. 97 of 2016, and DM Giustizia 110 of 7 August 2023, which establishes a maximum number of pages for administrative acts, are documents that highlight a growing sensitivity to the way the public sector manages information and communications to staff and citizens.

Since public sector information passes through an informatics system - requiring, for example, the creation of a dataset - the public sector is experiencing a phenomenon of 'datafication', which is changing the relationship between governments and citizens and the way governments address policy problems (Maffei et al., 2020). For example, 'digital twins' are data visualisation tools

designed to nudge a decision-making process (Thaler & Sunstein, 2021). In such a context, design begins to play a 'regulative role', influencing decisions and nudging behaviour through interfaces or visual representations (Prifti et al., 2024). Moreover, the public sector often engages people through complex real-time collaborative discussions and through oral or text-based communication using bureaucratic language that lacks transparency and inhibits the effective reception and use of information (Downe, 2023). These challenges represent an interesting area of research that requires an approach that integrates service design, which has so far been applied in the public sector, with information design logic.

Information design is an interdisciplinary practice (Pettersson, 1999) focused on decoding and visualising complexity (Lima, 2014; Hill & Lachenmeier, 2022) through 'inscriptive practices' (Lucas, 2020), such as mark-making activities that overcome the limitations of verbal and text-based contexts (Buchanan, 1992). Inscriptive practices, such as mind maps, notations and diagrams promote visual thinking and drawing as strategic and knowledge-producing agents (Mendelsund, 2014; McCloud, 1993; Mirzoeff, 2015).

The data of a text, whether words or numbers, are the 'raw materials' from which visualisations and methods can be generated to make an argument more comprehensible (Hill & Lachenmeier, 2022). In some cases, the data are not given at the outset, but are contextual, resulting from exploratory research in the field: this is the case of the experiments promoted by the Institute of Carthopology, aimed at public administrations that need to map and visualise an urban and social situation (Dear Hunter, 2024). In other cases, the data are time-based, as in the case of scribing activities, through the real-time sketching of an oral discourse at an event or during a discussion (Brand, 2017).

In the public sector, and more specifically in the context of legislative design, these activities are usually carried out 'after the event' and not simultaneously with the moment of decision making, which risks lacking interactivity in collaborative contexts (Johnson, 2014). Therefore, in order to contribute with a clear, honest and participatory approach that is required of the public sector (Downe, 2023), it seems urgent to intervene in the time and context of 'text production' (Rega, 2018; Perondi, 2024). When involving stakeholders who do not come from a design background, the degree of 'graphicacy', which is the ability to read and represent information using graphic and visual languages (Balchin & Coleman, 1966), must be taken into account and fostered, in order to define a common and effective language.

Thus, to improve public sector communication, it seems that design can propose itself as a discipline that empowers leaders, practitioners and citizens through visual thinking (Brand, 2017). Designers can contribute to the production of visual models that create a link between stakeholders and disciplinary experts (Mager & Davis, 2024), but above all to the definition of scalable methods for mapping, documenting and representing "design things" that create a shared language (Koskinen et al., 2011), with the ultimate aim of supporting an informed decision-

making process (Aricò, 2024).

In defining this approach and methods, the research generally aims to investigate the contextual and temporal impact of information design techniques in service design practices for the public sector. To validate the research, it will be necessary to assess whether inscriptive practices can be a trigger for promoting change in the public sector. Could inscriptive practices help to understand complexity? Could design support the actual textual and oral communication of the public sector to engage in a more effective and visual way? The study explores how visual communication affects strategies such as laws and policies, and examines its role in promoting informed decision-making and change. It examines the performative, contextual and temporal effects of information design in service design, with the aim of establishing methods for decoding and facilitating collaborative discourse in real time.

3. Objectives and Methodology

The scientific aim that runs through this ongoing research is the interdisciplinary extension of the field of design research. During the research, efforts will be made to involve and collaborate with different disciplines, in particular: linguistics, pedagogy, cartography, cognitive ergonomics, neuroscience, anthropology and law.

Due to its interdisciplinary nature, the research integrates several fields with different epistemological approaches. It experiments with merging information design methodologies and co-design practices in service design, while addressing ethical imperatives and contributing to the ongoing re-founding of the 'graphic of public utility'. Legal design, an emerging field seeking methodological rigour, is a focus, particularly in policy prototyping and concept mapping. It also explores foresight and anticipatory design, systematising knowledge and investigating the role of visual representation in regulatory decision-making.

Another key area of research is graphicacy, a largely under-explored academic field. It explores its importance as a fundamental intellectual skill, placing it alongside literacy and numeracy and linking it to pedagogy. Another focus is on education, in response to declining literacy rates and the need to improve transversal skills. By promoting visual thinking and graphic literacy, research aims to foster systemic thinking and metacognitive skills, reinforcing the lifelong learning perspective emphasised by global education policies.

The research project seeks social impact by developing a method that primarily addresses cognitive and ergonomic models of information reception, processing and exchange. It is relevant in compensating for the effects of information overload and reduced attention caused by social media and digital ecosystems.

3.1 Target and Audience

The main target group of the research is policy-makers who could benefit from a working method that makes the results of their processes more accurate,

supports participatory practices and reduces the time needed to produce a report. The policy makers could belong to any sector that involves an oral discussion or a written text to be summarised, in particular those in public offices in the legal field, such as legal drafters, and professionals responsible for communicating information to citizens.

The project has two indirect primary target groups. The first is citizens, who would benefit from greater transparency and better engagement by public administrations. The second is the regulatory authorities that ensure the transparency of information, such as the Garante della Privacy or the National Anti-Corruption Authority.

Academia is an indirect secondary audience, as the designed method could enhance service design curricula by introducing public sector knowledge and proposing graphicacy modules for legal education, fostering cross-disciplinary competences. Another audience is represented by realities that promote activities to facilitate change, such as professional associations and social innovation associations.

Regarding the field of intervention, Italy is the most appropriate starting point due to the linguistic and cultural components of the research. Comparative research will later be conducted in an Anglo-Saxon country, chosen for its differences in language, legal systems, political structures, design integration in the public sector and social attitudes towards change.

The research is scalable from local to international levels, although initial testing will focus on local or regional government for logistical reasons. Administrations that already involve designers in decision-making, such as those in Bologna and Bolzano, provide ideal pilot settings. The Municipality of Rome, particularly its districts, could provide a more complex field for testing the adaptability and scalability of the method. The presence of established policy labs in the UK could provide a fertile ground for innovation.

3.2 Phases and Methodology

The research project will be carried out over two years using a phased methodology.

Months 1 to 6 will focus on establishing the state of the art of information design within service design practices. This phase will include organising and attending seminars to explore current research, conducting a desk analysis to systematise the role of information design and inscriptive practices in the public sector, conducting fieldwork through concept mapping in co-design workshops and legal meetings. These activities will test the effectiveness of information design techniques and real-time representations. At the end of this phase, a taxonomy of techniques and practices relevant to the development of the methodology will be proposed. Linguists and lawyers will act as external consultants.

From month 5 to 7, the first period of mobility abroad will take place at the School of Innovation & Technology, Glasgow School of Art, where there will be the opportunity both to get in touch with the Anglo-Saxon system of service design and to support researchers working on design for policy through the methodologies of cultural probes and through visual mapping in support of performative co-design practices in complex collaborative contexts. At the end of this phase, the activities to be undertaken in the application of the method will be defined. Collaboration with anthropologists will add cultural and systemic insights to the research.

From month 8 to 11, the first pilot test of the method will take place, where text-based or verbal communication will be facilitated in an Italian public administration or social innovation context. Validation measures will be identified and cognitive ergonomists will help evaluate the activities to ensure usability and impact.

From month 10 to 13 the first version of the framework will be drafted. The framework will codify the method incorporating the taxonomy, activities and validation measures. Data collection for this phase, scheduled for months 11 to 12, will use a mixed research method involving semi-structured interviews and questionnaires.

From month 14 to 16, the second mobility abroad will take place in a location yet to be defined, likely in an Anglo-Saxon speaking country, to further contextualise and refine the method.

From months 17 to 19, a second pilot test will validate and refine the method in a different context. The results will feed into the second version of the framework, which will be developed from months 20 to 22. This version will integrate data from the second phase of the mixed methods research, conducted from months 19 to 20.

Finally, from months 19 to 24, the dissertation will be written, incorporating all the research findings. This phase will include preparing the results for dissemination in both digital and print formats and developing a comprehensive dissemination plan.

4. Expected Results

The project aims to contribute to research in the field of design, both at a theoretical level and, above all, at an applied level. On the theoretical and scientific production level, a publication will be produced and dissemination activities will be organised through participation in conferences within the interdisciplinary fields of the project.

At the applied level, all expected results will be products, interfaces and practices that can be used by others. The first level of this will be the development of a

method for the analysis and visual representation of written and oral texts, 'to train one to pay more attention, to observe more acutely and to listen more keenly' (Arnheim, 2004), and consequently to stimulate understanding of complexity and proactivity for change in the public sector. The method will be disseminated through the creation of a website so that the work can be 'open', and workshop activities and performance sessions will be organised to make the research results known through ad hoc events.

The second way in which the project will be tested is by experimenting with the method within an academic curriculum. A curriculum will be defined for any student who needs to study a subject with a strong textual component, or for any teacher who needs to coordinate a class discussion.

Keeping the order of difficulty in terms of feasibility, the third expected outcome is the definition of a minimum valuable product to provide visual facilitation, co-design and consultancy service for decoding complex subjects.

Finally, the fourth possible outcome of the project is the realisation of a software that incorporates logics, taxonomy and activities of the method.

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SharIN'House. Shaping interactions within IoT ecosystem through tangible interfaces

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ABSTRACT | Emerging forms of interaction and interfaces transcend traditional social constructs, shaping and being shaped by cultural and technological shifts. As everyday life patterns evolve, interest in co-living solutions is growing, driven by the need for flexibility and rising housing costs. These dynamics rely on interconnected product ecosystems, where tangible interfaces convert quantitative data into qualitative insights, shaping user behaviour. While the Internet of Things (IoT) enables this exchange through connected devices, design guides interactions by offering explicit feedback that fosters engagement. This research explores the intersection of IoT ecosystems and product development through a laboratory setting, where international designers investigate the behavioural effects of emerging technologies. The study unfolds in two phases: a qualitative field study using ethnographic methods and surveys to analyse interactions in shared spaces, followed by a speculative design approach embedding sensors to collect user-environment data. Actuators then convert this data into adaptive product configurations, transforming quantitative insights into qualitative feedback. Through an analysis of outcomes, this study establishes a framework for impact-share design, mapping behavioural effects in human-technology interactions. The dual cause-effect approach shows how IoT data transforms into qualitative insights, enhancing design for behavioural change. The research underscores how interconnected products shape shared environments, guiding future interactive design.

KEYWORDS | SOCIAL RELATIONS, BEHAVIOUR, QUALITATIVE ANALYSIS, COLIVING

1. Introduction

> "When everything is connected to everything else, for better or for worse, everything matters" (Mau & Leonard, 2004, p. 128)

Since the 'age of uncertainty' (Bauman, 2007), new interactions and interfaces have transcended traditional social constructs, shaping and being shaped by cultural and technological landscapes (Scolari, 2021). This shift demands adaptation to evolving work and leisure patterns, rekindling interest in co-living arrangements as responses to dynamic and flexible lifestyles (Ehrenberg & Keinonen, 2022). These transformations not only affect interpersonal relationships but also reshape the connections between individuals and their living and working environments (Piardi et al., 2012).

Co-living spaces, defined by the cohabitation of unrelated individuals sharing communal areas, offer an example of this evolving dynamic (Medar & Ćurčić, 2021). Residents of such spaces operate under specific codes and agreements that can influence individual behaviour (Meltzer, 2005), potentially leading to tensions. The type of interaction within co-housing environments is shaped by a variety of factors (Clitheroe et al., 1998), including personal traits, informal social dynamics, and formal structures such as house rules. Together, these elements contribute to the overall quality of the co-living experience. Conversely, artifacts within these spaces play a pivotal role in balancing the need for community-building with the preservation of individual privacy.

The interaction between interior space, artifacts, and social formats such as co-living highlights contemporary societal challenges, presenting design with opportunities to address new living conditions (Scullica et al., 2022). Future technologies - context-aware, networked, and proactive (Perera et al., 2014) - promise to dynamically adapt to individual needs, shaping spatial and social interactions. Research in interaction design (IxD) emphasises that engagement with technology emerges from the interplay between physical, cultural, and social elements. Understanding engagement with space should not only consider static configurations but also view it as an evolving interaction involving people, cultural practices, objects, and the surrounding environment (Anzani et al., 2022). Studies have identified key elements of engagement relevant to both technology and space, including cultural practices, physical conditions, and social interactions. Our physical presence in space influences our experience even before conscious sense-making, which is the foundation of an affective engagement (Fritsch, 2009). Sense-making is often supported by physical actions, emphasising the role of materiality in interactions with environments (Dalsgaard et al., 2011). In this context, IoT holds potential to provide valuable insights into behaviour by integrating physical devices within complex systems, thereby offering enriched, real-time data. Design can influence user behaviour (Fogg, 2009) by leveraging explicit feedback mechanisms, which facilitate new interaction models. While Fogg's concept of Persuasive Design lays the foundation for understanding how digital systems can shape behaviour, our approach diverges by focusing on how real-time, contextual feedback in IoT environments enable not only persuasion but also reflection and agency. Rather than purely steering behaviour, the design strategies explored here aim to support users in making informed decisions within dynamic, data-rich settings.

This study establishes a framework for impact-share design, mapping behavioural effects of human-technology interactions. By analysing laboratory outcomes, it illustrates how advanced, interconnected product systems drive behavioural change. A dual cause-effect approach translates quantitative sensor data into qualitative insights,

enhancing understanding of how IoT technologies facilitate new data exchange models and inform design practices that encourage behavioural shifts. As co-living expands as a living model, designers must balance "living and respect," ensuring social harmony. While conflicts may arise, understanding resident behaviours can guide design strategies that promote well-being, improve social bonds, and enhance overall co-living experience.

2. Critical interaction design

To shed further light on the design methodology deployed for this study, an in-depth analysis of Design Thinking and Critical Thinking is needed, to better tackle the role of empathy involvement and bring reflection on its implication in the design development. Moreover, the interplay between Design Thinking and Critical Thinking will be elaborated, to describe how those influenced the production of the results of the study.

The human-centred design approach is the backbone of Design Thinking (Verganti et al., 2021). Gathering user feedback is the starting point of this process that ends with the design and development of tailored solutions that fit customer needs. Building deep empathy through observation and ethnography with the recipients of the design aims at solving problems from their perspective (Brown, 2009).

At the same time as technologies become increasingly sophisticated and integrated into everyday life, making these technological advancements accessible and user-friendly become paramount. A salient example of this phenomenon is digitalisation; as Information Technology (IT) applications transition from business services to direct consumer use, the demand for design - particularly in the realms of User Experience (UX) and User Interface (UI) design - has surged.

Design Thinking drives the innovation process, UX Design examines the quality of the user experience, and Interaction Design shapes the dialogue between people and artefacts; together, these three perspectives guide the study and development of a product.

a. Empathic Design for User Experience

Empathy and active listening help designers understand user needs, desires, and motivations. In design thinking, this understanding is iteratively incorporated into solutions that address real user problems. Additionally, user interfaces can represent user behaviour data, subtly encouraging more socially acceptable actions.

User-centred design places user experience at its core while designers envisage empathic bridges to immerse themselves in users' lives - whether hypothetical, potential, or future - to ensure that products and services align with their needs (Koskinen et al., 2003). Gasparini (2015) defines that empathy can be either emotional - an instinctive, affective, shared, and mirrored experience - or cognitive, involving the ability to understand another's perspective (New & Kimbell, 2013; Spencer, 1881). According to this, an empathic approach becomes a crucial component in the design process that enables designers to connect with users on a deeper level for successful design outcomes (Kouprie & Sleeswijk Visser, 2009).

To foster this connection, tools and techniques adopted by designers include direct contact with users, supporting the first research part of a design process, effective communication of research findings, and ideation methods that leverage designers' own experiences. These approaches not only lead to a nuanced understanding of user needs

but also enable the creation of meaningful user-centred design solutions. As empathy can be conceptualised as a tool to design with, requiring the transformation of feelings into actionable attributes (Koskinen et al., 2003), designers can leverage empathy to gain valuable insights into users' needs, which subsequently informs the design process (Brown, 2009). For instance, in a Design Thinking framework, it is essential for all participants in a design team to empathise with the users for whom they are designing. This collective empathic engagement is crucial for generating relevant and effective solutions.

By these premises, using an emotional approach toward cognitive empathy bridge, designers apply different methods to build up that competence and insight, enabling them to prioritise the needs of the users and make the results of the process more desirable (Brown, 2008; Holloway, 2009; Ward et al., 2009). Communication of user study results could support both possibilities to immerse in the user's world and to reflect on it with the designer's own experiences. Communication tools should convey the expectations of the user's world, as well as an understanding of it. By using tools which combine raw data (e.g. video fragments, quotes) and suggestive leads towards interpretations, designers are supported in the act of designing. Data represented in stories, storyboards or in personas serves very well in allowing designers to step into and walk around in the user's world and connect with the user (Pruitt & Adlin, 2006).

b. Critical Thinking of Design interaction

Critical thinking complements design thinking by providing a framework for evaluating information, questioning assumptions, and analysing the implications of design decisions (Shelley, 2009). It encourages designers to reflect on their processes and outcomes, ensuring that the solutions developed are not only innovative but also ethically sound and socially responsible (Lilley & Wilson, 2013). For instance, the integration of critical thinking into the design process allows designers to assess the potential impacts of their work on user behaviour and societal norms, thereby promoting sustainable practices (Lilley, 2009). This refers to prompting individuals to consistently maintain positive behaviours over the long term and to do that it is essential to implement a strategy focused on behavioural sustainability. This approach strategically emphasises continuous engagement and reinforcement, helping people to adopt and sustain good practices over time. By creating lasting habits and fostering a culture of accountability, the strategy supports ongoing commitment to sustainable living behaviours, even as circumstances and dynamics evolve.

Reflective design practices challenge designers to critically examine their assumptions, encouraging them to reflect on the societal and ethical dimensions of their work. This approach ensures solutions are not only functional but also inclusive and socially responsive. These practices promote an iterative approach to uncovering and addressing biases, ensuring designs resonate with diverse user needs and contexts. Critical design, on the other hand, invites designers to interrogate societal norms, question dominant narratives, and propose alternative futures through speculative prototypes and thought-provoking scenario.

This reflective practice over sustainable practices is crucial in a rapidly changing technological landscape, where user needs and behaviours are continuously evolving. In summary, the interplay between design thinking and critical thinking is essential for understanding and influencing user behaviour. Design Thinking provides a structured approach to empathising with users and developing solutions, while critical thinking

ensures that these solutions are rigorously evaluated and refined. Together, they create a robust framework for addressing complex design challenges and fostering meaningful user interactions.

The iterative nature of UX design allows for continuous feedback and improvement, which is essential for refining how information is communicated. By employing methods such as user testing and feedback loops, designers can identify areas where the information relay may be lacking and make necessary adjustments to enhance the user experience. This iterative process is crucial for ensuring that the information provided is not only accurate but also resonates with users on a practical level.

This approach not only facilitates the implementation of innovative technologies but also ensures that these solutions are sustainable and socially responsible, ultimately contributing to behavioural change for an increased quality of shared living environments.

3. Beyond Data collection: tangible interfaces for IoT products

Since its conceptualisation in 1999 by Kevin Ashton[1], the IoT has rapidly integrated into everyday life, with projections estimating 55.9 billion interconnected devices by 2025 (Chan & Caprio, 2024). IoT refers to any electronic object with embedded sensors capable of collecting data and transmitting it to other components in the network. The European Commission highlights the role of IoT innovation clusters in fostering technological advancements and knowledge transfer (European Commission et al., 2019). Furthermore, McKinsey estimates that IoT could generate a global economic value between $5.5 trillion and $12.6 trillion by 2030, with consumer-oriented applications such as smart homes driving much of this growth (Chui et al., 2021).

Building upon its rapid adoption and projected economic impact, the influence of IoT extends beyond mere data collection, influencing the way information is interpreted and acted upon. While quantitative data provides numerical insights (e.g., temperature, energy consumption, traffic flow), qualitative data is equally crucial in design-driven applications. In the context of design, qualitative data encompasses user perceptions, contextual interactions, and emotional engagement with technology. Unlike purely quantitative metrics, qualitative data offers a deeper understanding of how users experience and interpret information, allowing for more meaningful interactions. IoT, through embedded sensors and tangible interfaces, has the potential to bridge the gap between raw data and human-centred insights, transforming data collection into a process that is not only analytical but also experiential.

By integrating tangible interaction principles with IoT ecosystems, designers and technologists can create richer, more intuitive experiences that leverage both quantitative and qualitative data. This approach not only enhances usability but also ensures that technology aligns with human behaviours, preferences, and sensory interactions. In this light, IoT becomes more than just a network of connected devices - it evolves into an ecosystem where data gains meaning through interaction, interpretation, and design-driven insights.

a. Interaction layers of IoT ecosystem

Interactions with digital devices increasingly combine graphical displays with sensors

that detect location, touch-less gestures and environmental cues, effectively tethering screen-based interfaces to the physical world. Yet, because feedback remains predominantly visual and confined to a private surface, these interfaces can limit multi-user engagement and embodied exploration. This form of interaction can Interactions with digital devices occur through abstract, screen-based interfaces that are disconnected from the physical world, creating a sense of alienation for users, as their interactions often feel unnatural or detached. According to Angelini et al. (2018), this alienation is a consequence of the abstraction and complexity of current IoT systems, which fail to align with the innate human abilities to interact with the physical environment. In this regard, tangible interaction may bridge the gap between the digital and physical worlds as it relies on embodied interaction, physical manipulation, material representation of data, and integration into real space (Hornecker & Buur, 2006). Modern touchscreen-based interfaces lack tactile depth and physical interactivity, reducing the effectiveness and naturalness of human interaction with technological tools - as envisioned by Bret Victor in one of his report[2]. By reintroducing the physical interaction, tangible interfaces can reduce alienation leveraging users' natural sensory and motor skills, fostering a deeper connection with IoT devices. Tangible User Interfaces (TUIs) address this gap by externalising digital state into graspable artefacts, offering spatial persistence, rich haptic feedback and opportunities for shared manipulation, thus complementing—not replacing—the role of screens within IoT ecosystems. Moreover, TUIs allow users to engage with digital systems in ways that feel more natural and intuitive, activating learning mechanisms (Revelle et al., 2005)

Conversely, richer interaction paradigms within IoT systems, grounded in tangible interaction, could foster deeper user understanding and stronger emotional bonds with objects, leveraging human abilities such as touch, spatial reasoning, and physical manipulation to create meaningful, reflective, and context-driven interactions (Krestanova et al., 2021). Furthermore, tangible interaction can provide immediate and intuitive feedback while also encouraging users to reflect on the system and its functionality. Rather than offering quick or superficial interaction, these interfaces allow users to explore and engage deeply with IoT devices, supporting collaborative use, influencing social dynamics as users share access to connected devices and engage in joint decision-making (Hofstra et al., 2008).

Tangible interaction enhances users' spatial awareness and physical engagement with the system, making interactions more intuitive and immersive. Additionally, it employs expressive, material representations that facilitate cognitive processes, making complex systems easier to understand and navigate (Shaer & Hornecker, 2009). One of the key advantages of tangible interaction is its persistence, as digital information is embedded in physical elements rather than being limited to transient screen-based displays (Rowland et al., 2015). This ensures that data remains accessible even when a system is inactive or temporarily disconnected, making tangible interfaces particularly valuable in IoT environments (van den Hoven et al., 2013). By maintaining a visible and interactive presence, these interfaces enhance both usability and system transparency, especially in shared spaces.

This persistence raises important questions about how interactive IoT devices can help users make sense of data. How IoT devices can enhance user interaction, simplify data interpretation, and support collaborative data collection and analysis (Rittenbruch & Donovan, 2019). Thus, offering an opportunity to transform the way users interact with IoT systems.

In this regard, a laboratory has been developed to investigate how tangible interaction through enhanced artifacts can provide immediate and intuitive feedback that encourages users to reflect on their co-living experiences. Particularly, if these shared interfaces could allow users to explore and engage deeply with IoT devices, supporting collaborative use, influencing social dynamics, and engaging in joint decision-making.

4. Interaction Design Studio: the SharIN'House lab experiment

The laboratory convened a group of young international designers to explore the potential of technological solutions tailored for the complexities of shared living environments. The laboratory adopted the Design Thinking process to guide the stages of empathy, definition of the problem, and rapid prototyping. During evaluation, UX design criteria enabled the measurement of the prototypes' perceptual quality and their impact on the roommates' daily lives. Finally, the tangible implementation of the prototypes was approached according to Interaction Design principles, with particular attention to physical-digital feedback and interaction timing. The participants were challenged to investigate the intentions behind emerging designs, particularly those leveraging the IoT to create ecosystems of interconnected products. The primary goal was to develop innovative solutions that facilitated seamless interaction between people, objects, and spaces, ultimately enriching information exchange for enhanced shared experiences.

To ensure a comprehensive evaluation of shared living dynamics and behaviours, three key areas were identified as a starting point: needs (e.g., daily personal needs), responsibilities (e.g., household management), and leisure (e.g., recreational activities).

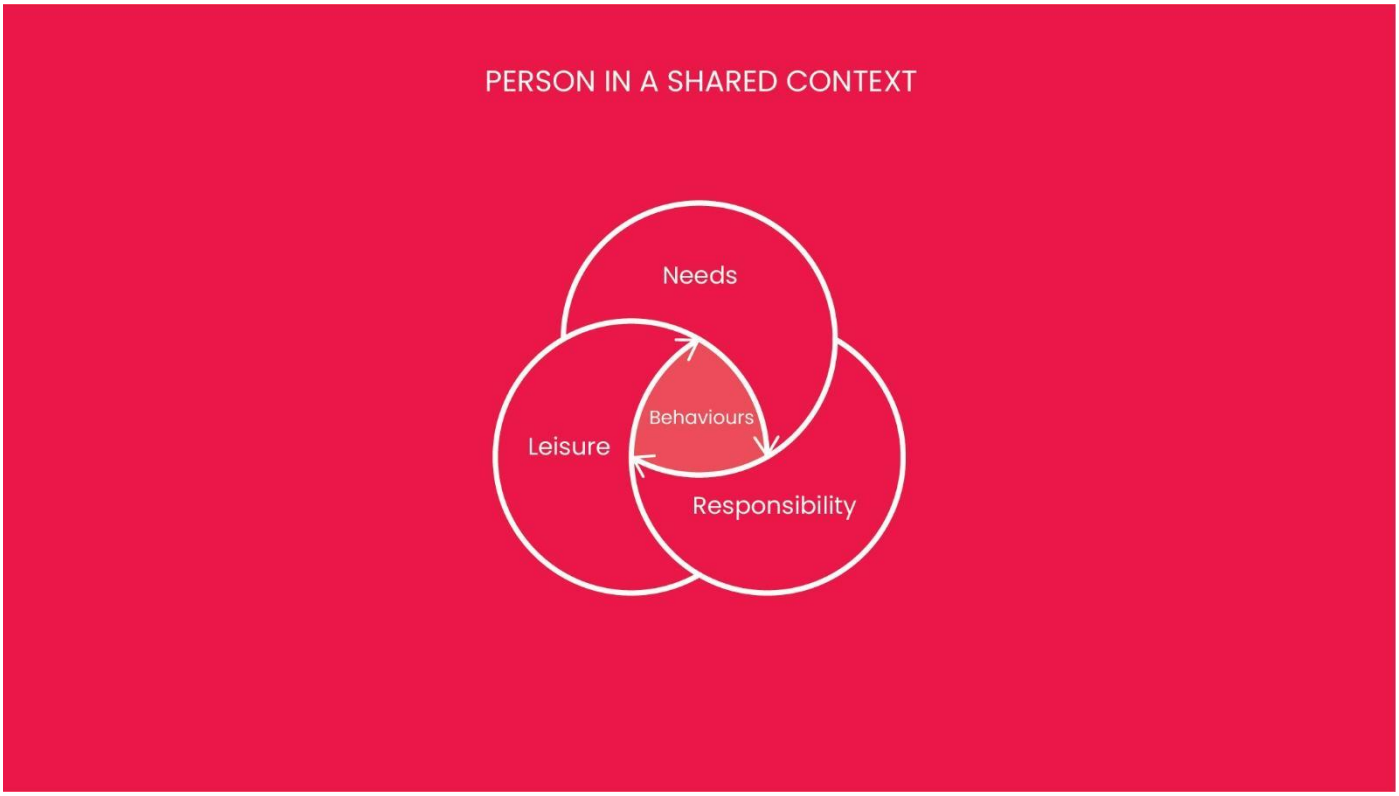


Figure 1. key areas identified by the laboratory as focus points.

The participants were organised into groups of three and assigned specific focus areas throughout the investigation and design process.

Through hands-on experimentation, designers were required to not only contribute to the development of products and services but also to consider the environmental contexts, cultural dynamics, technological possibilities that shape shared living while reflecting on the broader systemic implications of their interventions.

The lab was structured into two distinct phases: the first phase, which involved a qualitative field study to observe real-world interactions in shared housing environments; and a second phase, where designers integrated sensors and actuators into products, translating quantitative data into meaningful qualitative information.

a. First phase: co-living research

This phase is characterised by two iterative cycles comprising introductory interviews, design experiments, workshops, and follow-up interviews. Designers utilised a comprehensive analytical framework and an interdisciplinary approach to gather initial data from the ecosystem, including interactions within shared spaces and the use of everyday objects. The integration of design thinking and speculative design methodologies enriched this exploration, enabling a critical examination of contemporary shared living scenarios where housemates engage in diverse activities. To retrieve data around users and their experiences, qualitative methods such as ethnographic interviews (Fetterman, 2010), discovery templates, and 5Ws surveys (Su, 2014) were employed to elucidate key contextual aspects, namely: People, Spaces, Activities, Artifacts, and Behaviours which were collected through a grounded approach (Corbin & Strauss, 2008).

Structured prompts guided the investigation, focusing on:

1. Who: identifying users based on demographics, lifestyles, habits, routines, and specific needs.
2. What: mapping daily activities and tools to users' routines and the shared objects they interact with.
3. Why: exploring motivations and context to uncover reasons behind user actions and preferences.
4. When: analysing time allocation and routine patterns to determine activity frequencies and schedules.
5. Where: mapping spatial usage and interaction within shared environments.

To further contextualise the initial findings, designers employed a discovery sheet (figure 2) to develop a semi-structured, in-depth questionnaire. Interviews were then conducted with residents from distinct cohousing environments, selected for their contrasting spatial designs and social dynamics. This diversity allowed for a more comprehensive analysis of the potential influence of various factors, such as governance models, the organisation of shared activities, informal social structures, and individual attributes (Williams, 2005).

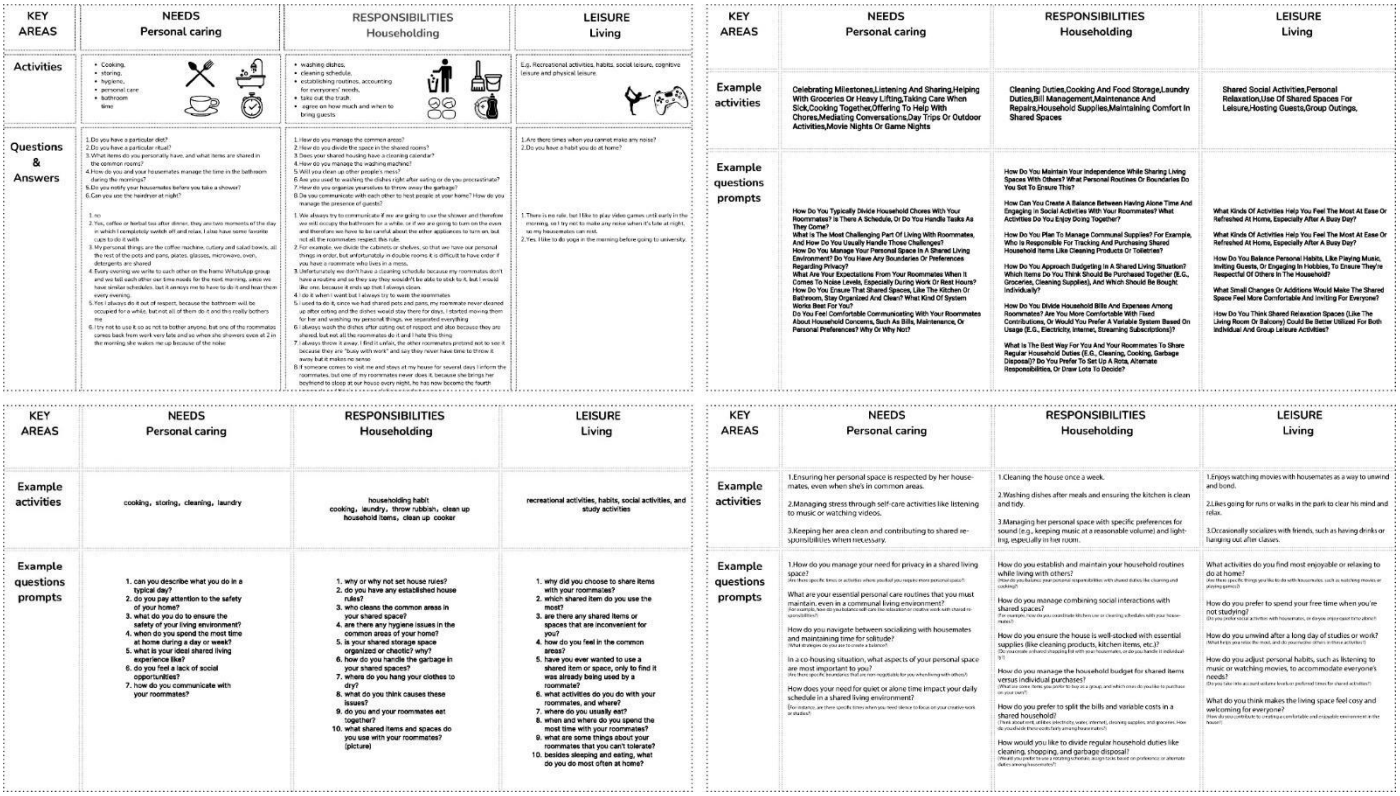


Figure 2. Filled Discovery Sheets examples.

The data collected provided valuable insights into the dynamics that govern housing, revealing user interaction pain points and areas of friction that could lead to tension among housemates. To further explore established routines, social norms, and opportunities for design in supporting sustainable practices in shared living, expert interventions in Design Thinking facilitated the design process through the implementation of a series of workshops.

b. Affinity clustering workshop

During the workshop's sessions, designers referred to the Double Diamond to generate actionable insights (Sanders, 2000). The process began with visual analysis, where participants used storytelling tools such as sketches and post-it to synthesise interview data (figure 3). Through affinity clustering, recurring responses were categorised, helping to uncover significant tendencies and representative behaviours. From these clusters, personas were developed, representing diverse profiles (e.g., introverted vs. extroverted, active vs. homebody), their behaviours, habits and interaction that influence how they interact with their environment, housemates, and resources (specific tools, devices, or spaces required for their tasks).

Figure 3. Visual data analysis and affinity clustering process.

Furthermore, detailed user journeys were created, revealing emotional responses including pains and gains. Through a comparison, critical points such as patterns of activity peaks (e.g., busiest times in the kitchen), their duration, and their impact on shared space usage were retrieved. Additionally, visual tools such as timelines and interaction flow/heat maps, clarified activity-space relationships, providing insight into spatial and functional design needs and the importance of shared norms in maintaining household rhythms.

Moreover, the workshops facilitated the designer to uncover the rationales for user actions (e.g., use of shared versus personal appliances) combined with their values, expectations (e.g., cleaning after use), and habits. Ultimately, it helped to identify opportunities for design intervention, acknowledging that successful co-living requires balancing individual behaviours and desires with effective governance, management, and the prevention of potential drawbacks. Thus, optimising the overall experience for residents.

c. Second phase: new scenarios

Initially, participants attended a workshop where they developed scenarios through collaborative design testing, simulations. These iterative processes allowed them to experiment with different rough prototypes (figure 4), configurations and systems, integrating sensors and actuators into products to generate real-time, quantitative data that enhanced understanding of user-environment interactions (figure 5).

Figure 4. Rough prototype iteration examples.

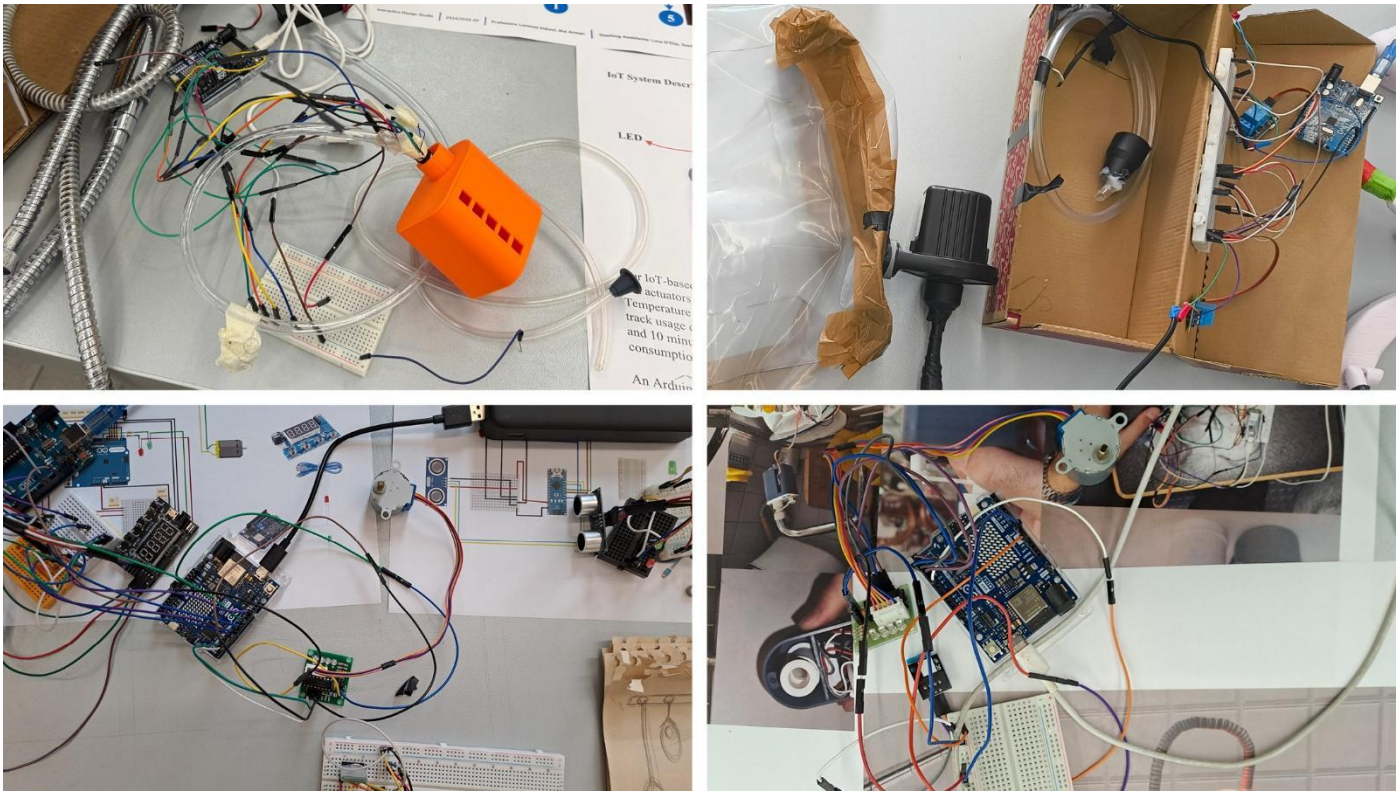


Figure 5. IoT system ideation and testing examples.

During the final phase, designers synthesised observations from the previous stages to design an interactive product system focusing on the quality of user interactions with their environment (figure 6). This phase emphasised translating quantitative data into qualitative information, creating systems that encourage reflection on shared responsibilities, daily habits, and collective values.

Figure 6. IoT system context application examples.

By processing data, designers reimagined the shared living ecosystem through interactive product systems that used data to inform decisions. These systems leveraged everyday activities and redefined the way shared spaces and artifacts are used, enabling communication exchange between housemates.

5. Interactive products

At the end of the design process, each group successfully developed products that effectively integrated a range of inputs and responded to the needs of shared living. From the analyses conducted, it emerged that the systems were capable of automatically filtering and prioritising the most relevant information, helping housemates manage their environment more effectively. In particular, it became clear that the success of co-living largely depends on three core factors: 1) Governance Structure, the effective implementation of organisational structures and rules to manage shared spaces ; 2) Qualitative Data Communication, the ability to convey complex information through communication physical artifacts; and 3) Behavioural Sustainability, the presence of a long-term engagement and reinforcement strategy, that creates lasting habits and supports ongoing commitment to sustainable living behaviours, even as dynamics evolve. These factors are critical for designing solutions that address specific behaviours and challenges, foster a sense of community and social interaction, reduce conflicts, and facilitate information sharing. All the factors and tools discussed thus far have been applied accordingly in the design process of the following projects.

a. KNOCKER X AIR SOFA

The *Knocker X Air Sofa* (figure 7) uses a connected knocker and modular sofa unit to promote fairer space-sharing behaviour. The sofa features an inflatable cushion that deflates when a user's emotional state - measured by the knock sensor - reaches a certain threshold. This creates an uncomfortable seating experience, encouraging users to leave the sofa thereby addressing any underlying tension.

1. Governance Structure: time limits on individual sofa use are defined by the system, regulating independent space.

2. Qualitative Data Communication: the inflation/deflation of the cushion visually and physically communicates the user's emotional state.

3. Behavioural Sustainability: the discomfort created by the deflation encourages users to leave the sofa, addressing conflict resolution and promoting healthy space-sharing behaviours.

Figure 7. Display of the final prototype and initial drafts of the *Knocker X Air Sofa* design, created by M. Ghods, K. Umitvar, T. Solakoglu.

b. RUG 'N' RACK SYSTEM

The *Rug 'n' Rack System* (figure 8) is designed to respond to spatial requirements and organisation while encouraging shared responsibility. By incorporating sensors to a combination of personal sanitary items such as a rug and individual holders, the system reminds users to return their belongings after use, using light, sound, and vibration cues.

1. Governance Structure: space limit on individual shower use is defined by the system, monitoring the presence of unwanted items.

2. Qualitative Data Communication: sensory feedback (light, sound, vibration) prompt users to return their belongings.

3. Behavioural Sustainability: automated reminders help users maintain communal routines and reduce friction.

Figure 8. Display of the final prototype and initial drafts of the *Rug 'n' Rack System* design, created by G. Tarantino, E. Zannetti, A. Aleksandrova.

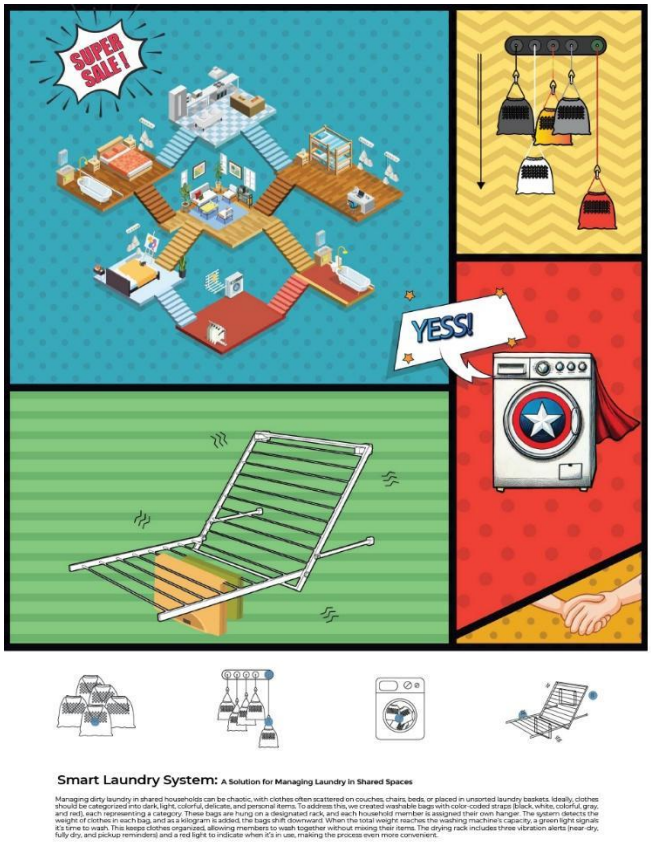
c. SMART LAUNDRY SYSTEM

The *Smart Laundry System* (figure 9) addresses the challenges of managing laundry in shared spaces while enhancing cooperation among housemates. The system uses wall-mounted hangers with different weight-sensing bags, to notify users when the collective amount of laundry is ready to be washed. The system features a smart drying rack that signals when clothes are dry, optimising laundry schedules and reducing conflicts.

1. Governance Structure: the system organises laundry schedules based on shared capacity and automated notifications.

2. Qualitative Data Communication: visual signals (green/red lights) and vibrations communicate laundry status to users. The rack vibrates at varying intensities to indicate drying progress.

3. Behavioural Sustainability: automated alerts reduce scheduling conflicts and promote cooperative laundry management.



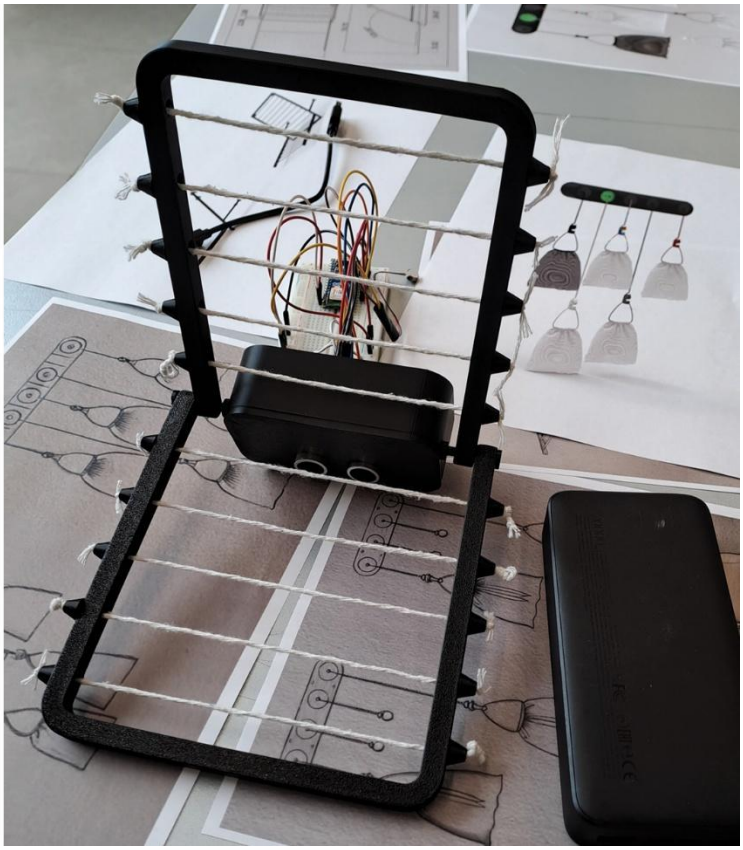


Figure 9. Display of the final prototype and initial drafts of the *Smart Laundry System* design, created by F. Esmaeilpour Amirikiasar, A. Mohebbi.

d. LEAFLINK

The *Leaflink* (figure 10) facilitates communication and social interaction in shared spaces through a central device (*Leaflink* Main) and individual devices (*Leaflink* Keyholder). It uses plant-themed devices to signal moods and availability, promoting social cohesion without disrupting personal privacy.

1. Governance Structure: the system allows housemates to communicate their moods or availability without direct confrontation.

2. Qualitative Data Communication: by blowing on the personal *Leaflink* device, mood and availability are signalled through light colours and plant movements on the central *Leaflink* main device.

3. Behavioural Sustainability: the system encourages a balance between social interaction and solitude, allowing for flexible communication and respect for privacy.

Figure 10. Display of the final prototype and initial drafts of the *Laflink* design, created by Y. Elkayam, G. Pan, L. Barberis.

e. SMART SHARING HOME WATER MANAGEMENT SYSTEM

The Smart Sharing Home Water Management System (figure 11) is designed to promote cooperation among users by regulating water flow in shared spaces during peak usage times. Thanks to devices specifically designed for the sinks and showers taps, the project ensures that hot water and water pressure is available to all housemates by limiting flow based on usage patterns.

1. Governance Structure: limits water usage per person, ensuring fairness during shared use.

2. Qualitative Data Communication: water usage is regulated and communicated through system cues, such as changes in water pressure.

3. Behavioural Sustainability: encourages mindful water usage while ensuring equitable access to shared resources.

Figure 11. Display of the final prototype and initial drafts of the *Smart Sharing Home Water Management System* design, created by S. Elyasi, F. M'Haimah Romero, D. Voskanian.

f. CLESSHYDRA

Clesshydra (figure 12) is a system designed to foster accountability among housemates by reducing conflicts over bathroom resources access. The project features a showerhead that measures water usage and a clepsydra (water clock) that visually displays consumption.

1. Governance Structure: regulates time and water usage, ensuring fair distribution and reducing overuse.

2. Qualitative Data Communication: water usage is displayed visually through the clepsydra, making data tangible.

3. Behavioural Sustainability: by promoting mindful usage, the system encourages water conservation and fosters shared responsibility.

Figure 12. Display of the final prototype and initial drafts of the *Clesshydra* design, created by E. Ricci, M. De Cagna, C. N. Putri.

g. LIVING VOID

The *Living Void* (figure 13) addresses waste management in shared living spaces, ensuring liability and proper waste disposal through automated alerts. The system features a bin and connects personal devices that notify users when the bin reaches its full capacity.

1. Governance Structure: the system regulates responsibility-sharing by ensuring each housemate takes turns managing the garbage.

2. Qualitative Data Communication: the system triggers visual and sensory responses (e.g., smoke or light) to indicate when it's time to take out the trash.

3. Behavioural Sustainability: automated alerts and reminders help users stay accountable for waste management, ensuring a clean and healthy living space over time.

Figure 13. Display of the final prototype and initial drafts of the *Living Void* design, created by L. Arena, Y. Zhang, A. Ponzi.

h. AURA

The Aura system (figure 14) is designed to foster social interaction among housemates. It consists of three objects: a carpet, a light cube, and an outer lamp. The carpet detects when someone is alone in the room and shifts to a "sad" mode. Tapping on it triggers signals to invite other housemates. Once they join, the carpet recognises the type of activity - whether it's socialising, calm socialising, or partying - and communicates with the light cube. The light cube adjusts accordingly, creating a relaxing atmosphere during calm socialising or emitting colourful lights during parties to encourage dancing.

1. Governance Structure: encourages social interaction by prompting users to connect when alone, fostering a shared experience in the living space.

2. Qualitative Data Communication: the carpet's change in mood and the light cube's responsive lighting visually communicate the activity type and emotional atmosphere.

3. Behavioural Sustainability: the system promotes increased social interaction, reducing loneliness and enhancing positive engagement within shared living spaces.

Figure 14. Display of the final prototype and initial drafts of the *Aura* design, created by O. Özder, S. S. Tok, C. Del Palacio.

i. GHOST HOUSE

The Ghost House (figure 15) is an ecosystem of products designed to monitor and manage noise levels in shared living spaces, particularly in the dining room. When the noise exceeds a predefined threshold, the ceiling lamp begins to swing like a pendulum. If the noise persists, the standing lamp dims its light, and if the noise level remains too high, the radio emits intermittent sounds to alert the housemates until the noise level is reduced.

1. Governance Structure: Regulates noise levels by encouraging quieter behaviour in shared spaces.

2. Qualitative Data Communication: The system uses visual cues (pendulum motion, dimming light) and auditory signals (radio noise) to indicate excessive noise, prompting users to reduce their sound levels.

3. Behavioural Sustainability: By encouraging quieter behaviour through intrusive alerts, the system reduces conflicts and fosters a respectful shared environment.

Figure 15. Display of the final prototype and initial drafts of the *Ghost House* design, created by A. Scardigno, M. Ladhiri, L. D. Guijosa Perez.

6. Interactive Design lab's findings

From the analysis and the consideration stated so far, it is possible to retrieve a first picture of a potential tendency of design outcomes when dealing with friction points and areas of tension that commonly arise in shared living environments. The insight gained throughout the design process has highlighted the same design paths when designers are exposed to specific key areas, namely needs, responsibility and leisure.

Table 1. Key areas of intervention for design, namely needs, responsibility, leisure and result.

Need	Responsibility	Leisure	Aim
Regulating independent space usage	Monitor shared space usage	Promote social interaction	Promote fairer space-sharing behaviour

It is evident that the design process has inevitably overlapped these areas to put into system the intricate interplay between individual physical, personal, and social factors influencing behaviour in shared living environments.

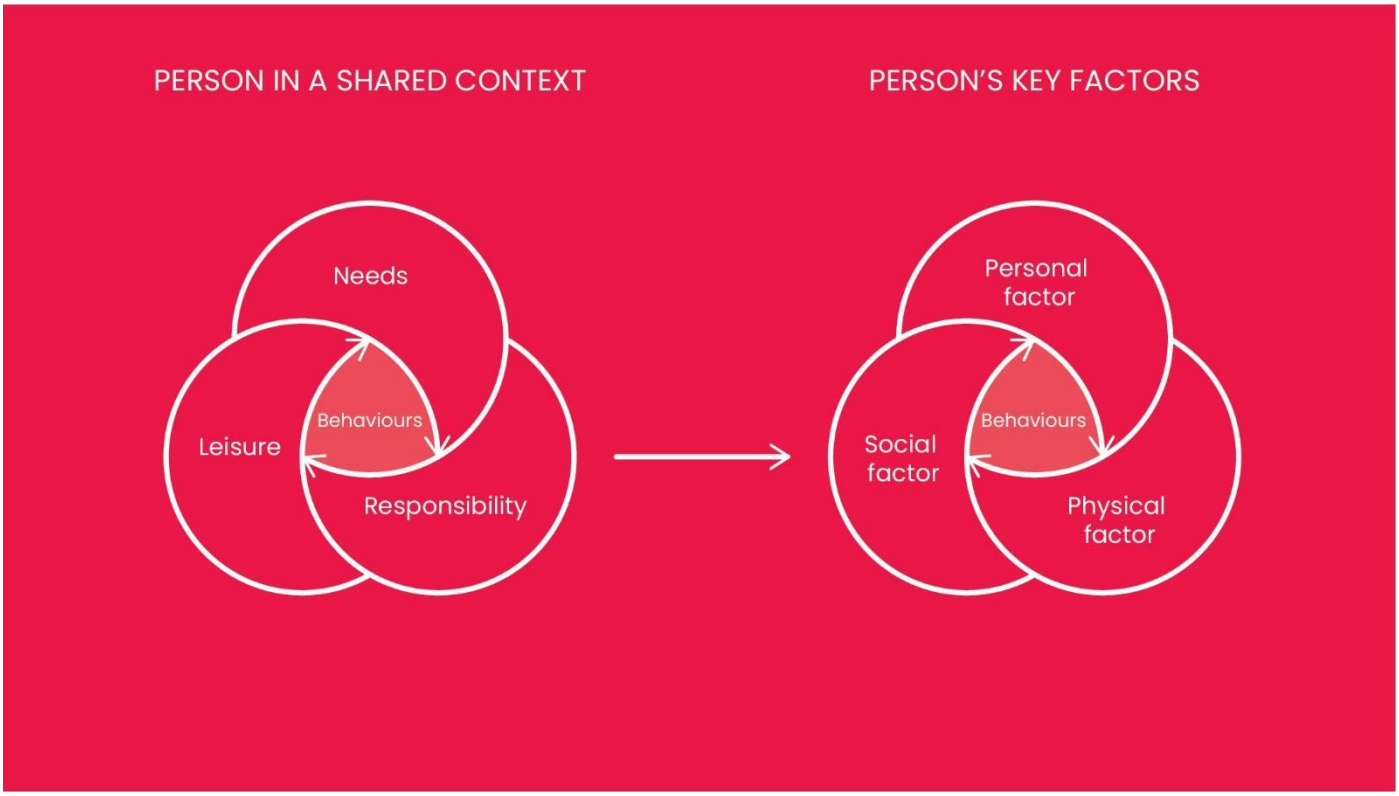


Figure 16. The interaction between physical, personal and social factors and impact on behaviour. Source: Adapted from Williams (2005).

It is possible to see a change in behaviour resulting in frictions as soon as people are put in shared environments, where the organisation of the physical space and the social context are significantly shaped. In such a scenario, the intervention of Design and the integration of advanced IoT technologies have shown the potential to escalate these challenges while enhancing new behaviours. By actively connect physical objects, new value-added information and functionalities for users are provided. Devices, information, users, and applications are integrated to create an IoT ecosystem in which new solution and products are developed in an organic way, mediating possible drawbacks.

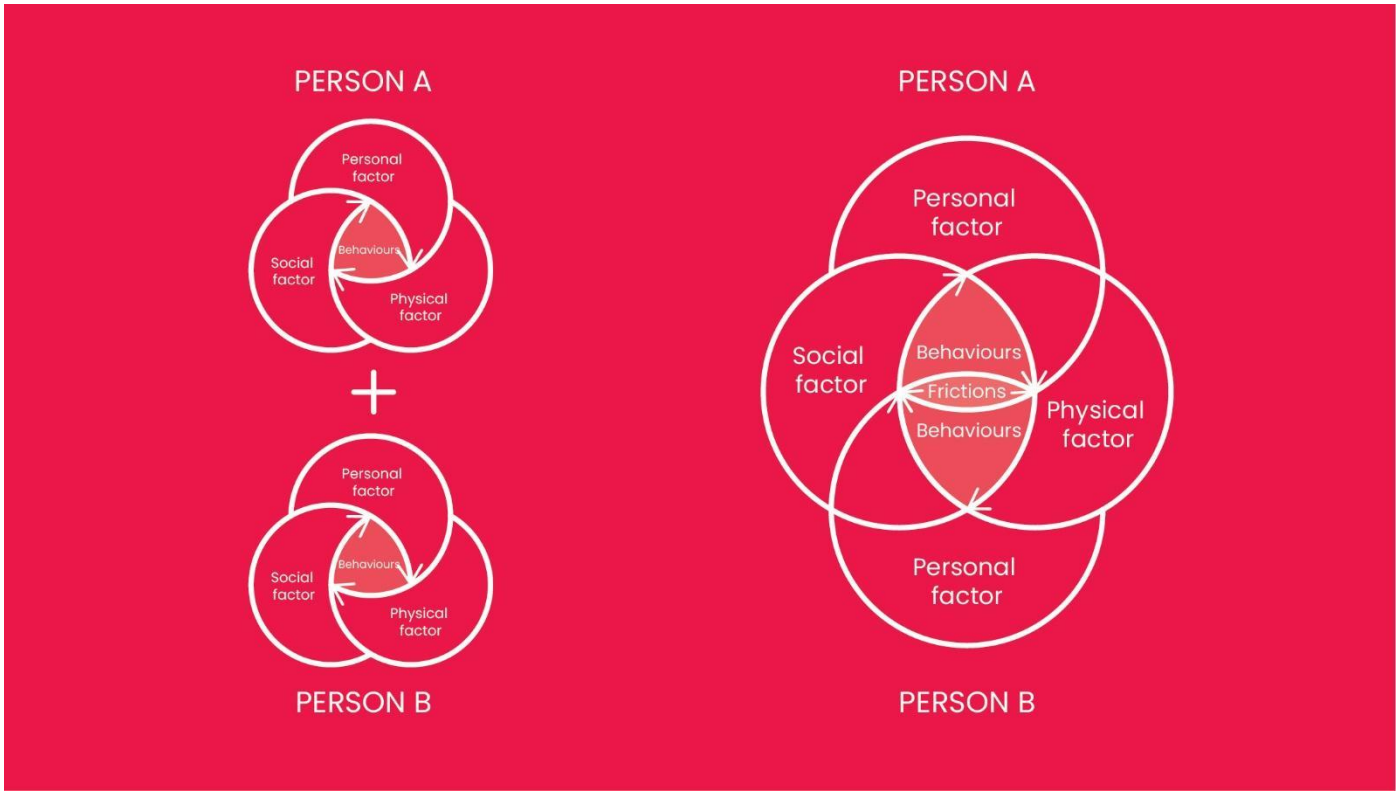


Figure 17. Interaction between more people in the same context causing frictions.

The findings suggest that through critical thinking approach, products not only become emphatic and tailored to the user needs but are capable of promptly picture, manage and reduce future tensions.

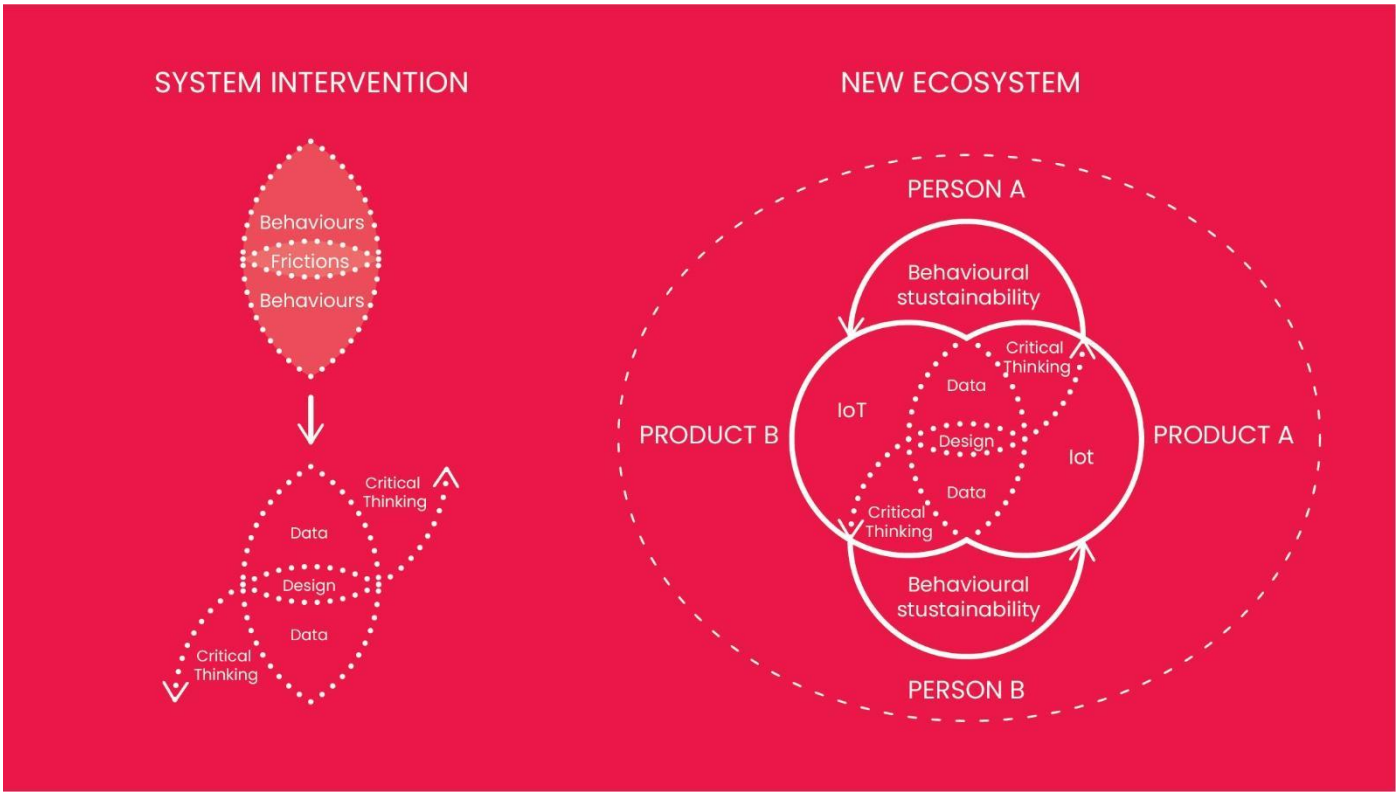


Figure 18. Design – System intervention and resulting new ecosystem.

Moreover, the study was able to establish a framework for impact-share design that traces behavioural effects of human-technology interactions. The findings suggest that richer interaction within IoT systems, grounded in physical products, could foster deeper user understanding of their behaviours with their surroundings, creating meaningful, reflective, and context-driven interactions. The dual cause-effect approach facilitates the transformation of quantitative sensor data into qualitative insights, enhancing our understanding of how IoT technologies can enable new forms of qualitative data exchange, ultimately informing new practices that promote continuous sustainable behavioural changes.

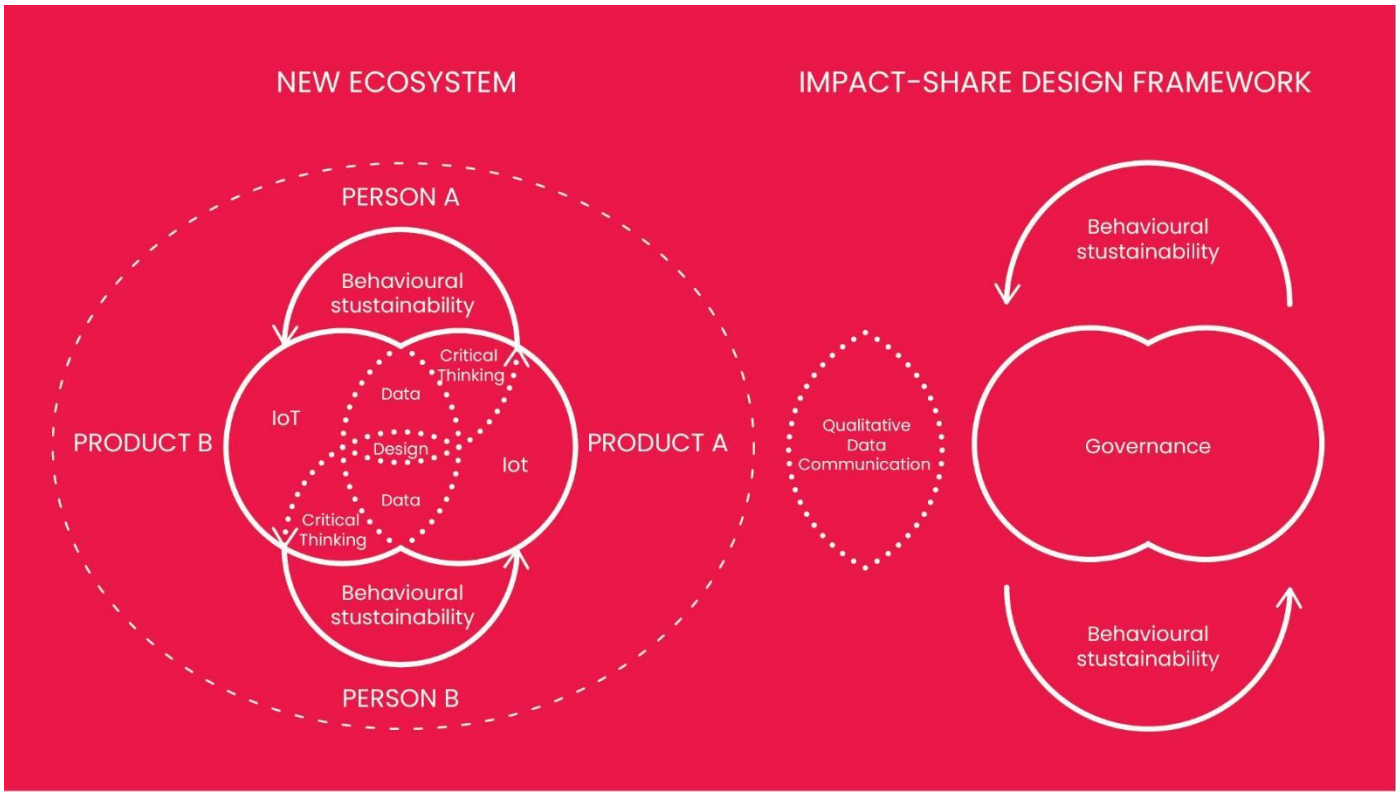


Figure 19. Impact-share design framework.

The dual cause-effect approach describes the bidirectional influence between IoT system implementations and user behavior in co-living situations. This approach recognizes that technological solutions shape social interactions while simultaneously being influenced by user feedback.
The approach emphasizes the interplay between causation initiated by design (e.g., IoT features prompting user interaction) and causation emerging from user behavior (e.g., feedback loops shaping future design iterations).
For this paper, the dual cause-effect approach was applied through iterative design sprints, user testing, and scenario-based evaluations. Each phase focused on capturing both designer-intended outcomes and emergent user behaviors.
Drawing on an example the IoT-enabled Shared Kitchen had as intent from the designer to reduce food waste by monitoring inventory and suggesting recipes. The emergent behavior was that users developed communal meal preparation routines, enhancing social cohesion.
To operationalize the dual cause-effect approach, designers should:

1. Identify bidirectional influences during the ideation phase.
2. Incorporate iterative feedback loops throughout development.
3. Leverage user insights to refine and evolve the designs.

7. Discussions

The findings of this study emphasise the critical role of design in addressing the inherent tensions and friction points that arise in shared living environments. When individuals engage in co-living arrangements, their behaviours inevitably shift in response to new social dynamics and spatial constraints. These behavioural changes can generate tensions, particularly in key areas such as personal needs, shared responsibilities, and leisure activities. Design, therefore, emerges as a fundamental mediator, capable of shaping interactions, fostering balance, and enhancing the overall co-living experience.

A central insight from this research is the potential of integrating IoT technologies into shared domestic spaces. By embedding sensors and actuators into physical objects, IoT facilitates the seamless exchange of information, allowing occupants to make more informed decisions about their communal environment. This technological integration enables products to act as intermediaries that encourage responsible behaviour, optimise shared resource management, and support more meaningful social interactions. Through real-time feedback mechanisms, IoT solutions enhance user awareness of their interactions with both their surroundings and cohabitants, ultimately promoting more conscious and pleasant living practices.

However, effective design solutions extend beyond the physical environment to include strategies for fostering fairness and cooperation among residents. Interfaces that encourage knowledge sharing, structured decision-making, and communal engagement can significantly contribute to reducing conflict and reinforcing a sense of collective responsibility. These design-driven interventions ensure that co-living spaces remain adaptable and supportive, accommodating the evolving needs of residents while maintaining a stable and cooperative atmosphere. In fact, beyond technological integration, the study highlights that the establishment of clear governance structures, and the enhancement of sustainable behaviour are enhanced through communication mechanisms within co-living settings.

Moreover, the transformation of sensor-generated quantitative data into qualitative insights is a key factor in understanding and enhancing co-living experiences. By analysing behavioural patterns and engagement levels, designers can refine interactions within shared environments, creating systems that actively shape and sustain positive behaviours. The research introduces a framework for "impact-share design," which traces the behavioural effects of human-technology interactions, offering a structured approach to designing solutions that reinforce shared responsibilities and collective values.

This approach strategically emphasises continuous engagement and reinforcement, helping individuals adopt and sustain positive behaviours over the long term. By creating lasting habits and fostering a culture of accountability, the strategy supports ongoing commitment to sustainable living behaviours, even as circumstances and dynamics evolve.

8. Conclusions

This study underscores the transformative potential of design in shaping in-house co-dwelling experiences. By integrating technology, behavioural insights, and effective governance strategies, design can mitigate tensions, foster meaningful interactions, and

create sustainable frameworks for shared living. Through a holistic approach that considers both social and spatial dynamics, the findings contribute to a deeper understanding of how tangible interaction through technological artifacts can enhance the quality of communication, ultimately ensuring that information exchange remain functional, inclusive, and enriching for all residents.

While IoT technologies offer considerable opportunities for translating sensor-generated quantitative data into qualitative insights - being context-aware, networked, and proactive - design must balance innovation with ethical considerations allowing users to explore, engage and reflect deeply with IoT devices, supporting collaborative use, influencing social dynamics, and engaging in joint decision-making.

Notes

1. On June 22, 2009, Kevin Ashton shared a definition on the RFID Journal website, recalling how the term "Internet of Things" was accidentally coined as the title of a presentation he gave at Procter & Gamble in 1999. The phrase was then used in a scientific publication for the first time a decade later. That 'Internet of Things' thing. RFID Journal. Retrieved on January 20th, 2025, from https://web.archive.org/web/20130415194522/http://www.rfidjournal.com/articles/view?4986

2. Victor, B. (2011). A brief rant on the future of interaction design. Retrieved on February 5th, 2025, from https://worrydream.com/ABriefRantOnTheFutureOfInteractionDesign/

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TYPEFACE DESIGN TO PRESERVE CULTURAL DIVERSITY: THE MISSING SCRIPTS PROJECT.

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ABSTRACT | The Missing Scripts Project started from the alarming realization that nearly half of the world's writing systems remain absent from digital platforms. Among these are not only ancient scripts, some of which remain undeciphered, but also a large number of minority or Indigenous scripts still in use today. Neglected by the digital industry, these scripts, along with the languages they represent face the threat of extinction. How can we fix this situation? The initial step involves encoding these scripts, a process that entails standardizing them by assigning a numerical identifier to each symbol.
This crucial task has been carried out by the Universal Unicode Standard since the early 1990s. However, mere encoding is insufficient. Equally imperative is the development of input methods such as keyboards to ensure compatibility across various operating systems, as well as the creation of appropriate fonts. Designing these "digital fonts" requires specialized expertise, involving collaboration with experts, including linguists, developers and native speakers. Making these scripts accessible on computers and smartphones requires an approach that combines technology, art, culture and typographic design.
This is the goal of the Missing Scripts Project, a collective project that brings together 3 institutions: the Atelier national de recherche typographique (ANRT) in Nancy (France); Designlabor Gutenberg, Hochschule Mainz (Germany), and The Script Encoding Initiative, in the Department of Linguistics of UC Berkeley (USA).
Since 2016, 14 students from around the world have joined the Missing Scripts project, for 2-year courses at ANRT dedicated to the development of digital fonts for unencoded or newly-encoded scripts. Along the way, very specific expertise has been developed and improved.

T. Huot-Marchand

KEYWORDS | TYPEFACE DESIGN, FONTS, ENCODING, UNICODE, DIVERSITY

1. Introduction

The Missing Scripts Project began from the alarming realization that half of the world's writing systems remain absent from digital platforms. Among these are not only ancient scripts, some of which remain undeciphered, but also a large number of minority or Indigenous scripts still in use today. Neglected by the digital industry, these scripts, along with the languages they represent, face the threat of extinction. How can we address this situation? The initial step involves encoding these scripts, a process that entails standardizing them by assigning a numerical identifier to each symbol.
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This is the goal of the Missing Scripts Project, a collective initiative that brings together three institutions:

- **The Atelier National de Recherche Typographique (ANRT)**, a postgraduate research course created in 1985, established at the École nationale supérieure d'art et de design in Nancy, France;
- **Designlabor Gutenberg**, within the School of Design of Hochschule Mainz, Germany, and in particular, the *decodeunicode* project developed by Prof. Johannes Bergerhausen;
- **The Script Encoding Initiative (SEI)**, founded in 2000 by Prof. Deborah Anderson in the Department of Linguistics at UC Berkeley, USA, and led today by Anushah Hossain, PhD.

The Missing Scripts Project aims to:

- List and analyze scripts that are not yet encoded in Unicode;
- Draw attention to the importance of encoding these scripts;
- Facilitate exchanges between researchers, linguists, and designers;
- Design digital fonts for those scripts that have been recently encoded or are about to be encoded.

2. Historical Background

The **Atelier National de Création Typographique (ANCT)** was created in 1985 at the

Imprimerie Nationale in Paris to "relaunch" the French typographic scene. In the late 1970s, typography in France was in a critical state. The four main type foundries (Hollenstein, Olive, Deberny & Peignot, and Fonderie Typographique Française) had all closed, leaving the Imprimerie Nationale as the only remaining institution. The major figures of French typography (Charles Peignot, Roger Excoffon, Ladislas Mandel, José Mendoza, Adrian Frutiger, Fernand Baudin, Gérard Blanchard, etc.) collaborated to find solutions, leading to the founding of ANCT. In 1997, the Atelier moved to the École nationale des arts décoratifs in Paris and was renamed **Atelier National de Recherche Typographique (ANRT)**. In 2000, ANRT moved to the École nationale supérieure d'art et de design (ENSAD)in Nancy. After closing for six years between 2006 and 2012, it reopened with a new director (Thomas Huot-Marchand), a new team (Jérôme Knebusch, Charles Mazé, Émilie Rigaud, and Alice Savoie), and a new scientific project.
Two main research areas developed at ANRT during its reopening echo the heritage of the Imprimerie Nationale, which boasts over four centuries of history: the development of typographic solutions for scholarly publications, and the creation of typefaces for the world's writing systems.
The **Imprimerie Nationale** is the oldest typographic institution in the Western world, with a rich collection of "non-Latin" typefaces. It began with the **Grecs du Roy** by Claude Garamont (1544-1550) and covers a total of 65 writing systems in nearly 150 styles. In the 19th century, so-called "Oriental" typography flourished at the Imprimerie Nationale, driven by the discovery of ancient languages and the rise of philology. In many ways, the Imprimerie Nationale played a role similar to Unicode for several centuries, adapting a variety of writing systems to the typographic techniques developed in Europe. This included non-alphabetic scripts, such as the **Buis du Régent** (86,000 sinograms cut in wood by Étienne Fourmont between 1723 and 1730 and later completed by de Guignes from 1811 to 1813), or **Egyptian hieroglyphs** (3,325 punches cut between 1842 and 1852 by Delafond and Ramé fils). Though now obsolete and sometimes scientifically debated, these achievements continue to inspire contemporary researchers and designers, both graphically and methodologically[1].

3. Studied Scripts

Since 2016, 14 students from around the world have joined the Missing Scripts project, for 2-year courses at ANRT dedicated to the development of digital fonts for unencoded or newly-encoded scripts.

- 2016-2018: Arthur Francietta (Martinique, 1990) designed fonts for **Paleo Hispanic**, a set of writing systems which appeared on the Iberian Peninsula. Semi-syllabic rather than purely alphabetical, these scripts exist three kinds (Northern, Southern, and Greco-Iberian), identified in inscriptions on stone or on metal.
- 2017-2019: Morgane Pierson (France, 1994) worked on **Elymaic**, a writing system, derived from Aramaic, that was developed at the turn of the common era (from the 2nd century BCE to the third century CE) in the Middle East. It is an Abjad, non-joining, comprised of 46 glyphs. This script was integrated into version 12.0 of the Unicode Standard in March 2019. A few months later, Morgane Pierson produced the first digital font of this writing system: Noto Sans Elymaic, which is published under open-source license by Google Fonts.
- 2018-2020: Émilie Aurat (France, 1994) worked on the script of the Ndyuka people, settled along the Maroni river, in Suriname, South America. Ndjuka is the only creole

[1] See FOURNIER, P., L'écriture hiéroglyphique au prisme du design typographique : Un observatoire critique de l'égyptologie, PhD thesis, Projekt, Université de Nîmes, 2023

language that has a script of its own: it is **Afáka**, which came to its author, Afáka Atumisi, in a dream, in 1908.

- 2019-2021: Alexandre Bassi (France, 1993) studied **Mayan Hieroglyphs**. It is a logosyllabic writing system that combines logograms with a phonetic notation: a glyph can represent a word, a concept, or a syllable. It is comprised of a great number of allographs: several signs can express the same word. As part of The Missing Scripts program, Alexandre Bassi studied the Mayan writing system in contact with a team of international specialists . He looked in particular at the Dresden Codex, whose painted hieroglyphs are of a remarkable quality. A rigorous analysis of their drawing made it possible for Bassi to transpose them into a digital form: a technical challenge, considering the complexity of the forms, and their astonishing plasticity
- 2019-2021: Parimal Parmar (India, 1990) studied **Sharada**, a script derived from Brahmi, from the 8th to the 20th centuries Sharada is the principal writing system of Kashmir, India. It was used for writing Sanskrit, Kashmiri, and other languages of northern South Asia. It is an alpha-syllabary, or abugida, that uses signs or combinations of signs to notate phonemes.
- 2020-2022: Amir Mahdi Moslehi (Iran, 1990) worked on **Book Pahlavi**, a writing system from Iran, used until the end of the Sasanian period, in the 6th century of the common era. It is still used today in the Zoroastrian literary community. Its integration into Unicode is ongoing. Expert in persian calligraphy, Amir Mahdi Moslehi developed the first Book Pahlavi digital font, through a precise analysis of historical manuscripts. Much like Arabic, this alphabet is an abjad in which only consonants are notated. In the end of the project, Moslehi published Meraban, a typeface family in the Czech type foundry Rosetta, which also included Latin, Arabic and Avestan, another Middle Persian script.
- 2021-2023: Fernando Caro (Brasil, 1983) worked on **Dives Akuru**, the official script of the Maldive islands, between the 9th and 18th centuries. Like other writing systems from Southeast Asia, such as Sinhalese and Tamil, its origin lies in the Brahmi alphabet. Dives Akuru only existed in handwritten form and had not undergone any typographical adaptation. Many manuscripts and inscriptions still exist, and this script is currently the object of a renewed interest among native populations. With the help of anthropologists, linguists, and the Maritime Asia Heritage Survey, Fernando Caro analyzes the style of Dives Akuru in order to render its cursivity in a digital font.
- 2021-2023: Sina Fakour (Iran, 1987) studied **Linear Elamite**, one of the writing systems used to notate the Elamite language toward the end of the third millennium BCE, in Elam, on the land of present-day Iran. Discovered at the beginning of the 20th century in Susa, this writing system was deciphered between 2017 and 2020 by the French archeologist François Desset. 5 vowels, 12 consonants, and 60 combinations make linear Elamite the first alpha-syllabary in the history of humanity. Entirely abstract and phonetic, its deciphering upsets established conceptions regarding the origins of writing. Since 2021, Sina Fakour has been working at ANRT with François Desset on the typographical transcription of this script, and on a Unicode proposal for its encoding.
- 2022-2024: Kaveh Ashourinia (Iran, 1980) kept working with François Desset on **Proto Elamite**, from which linear Elamite is derived, and which is still undeciphered. Kaveh Nia (born in 1980 in Iran) has been studying their design at the ANRT since autumn 2022.
- 2022-2024: Adam Yeo (Ivory Coast, 1986) created a digital typeface for the **Bété** script, created by Frédéric Bruly-Bouabré in 1956 to note the Bété language, spoken

by more than 5 millions people in Ivory Coast. Based on an exhaustive analysis of existing documentation on the Bété script, Adam Yeo developed a consistent system to transcribe the 449 of the Bété syllabary in digital form.
- 2023-2025: Ariq Syauqi (Indonesia, 1994) first studied **Lampung** script, conventionally used to write Lampung language in Sumatra, Indonesia, about to be encoded in Unicode. This research led him to examine the related Rejang and Kerinci scripts in order to gain a better understanding of the relationships and stylistic particularities of Southern Sumatra scripts.
- 2023-2025: Fangzheng Li (China, 1990) worked on **Sidetic**, one of the ancient Anatolian alphabets (including Carien, Lycian, and Lydian) used to record Anatolian and Phrygian languages, and the only one to remain unencoded. In total, Sidetic contains 29 letters containing both vowels and consonants, strongly influenced by Greek, establishing connections with the diverse cultural and linguistic contexts of ancient Anatolia.
- 2024-2026: The current session of the program includes two new student-researchers, both working on indigenous scripts that are still in use but not yet encoded. Franco Jonas (Chile, 1995) is studying the **Eskaya** script of the Philippines, while Nunzio Mazzaferro (Italy, 1995) is researching the **Masaba** script of Mali. Their research projects, currently in development, will continue until September 2026.

4. Research Outputs

In most cases, missing scripts lack established typographic reference models. Whether dealing with living or historical scripts, the typographic adaptations within the Missing Scripts Project take into account:
- The **nature** of reference models (inscriptions in stone, metal, handwritten, or painted);
- The **ductus** (the order and direction in which the strokes are drawn);
- The **writing tool** used, which influences letterforms (e.g., ballpoint pen, reed pen, brush);
- The **plasticity** of the script (the degree of variation in the shapes of glyphs), studied to deduce formal archetypes for each glyph;
- The **formal logic** of each script, digitally transcribed in Bézier curves while maintaining fidelity to the original sources;
- **Encoding strategies**, ensuring font software programming aligns with the script's structure (alphabet, syllabary, abjad, ideographic system, etc.).

Depending on their level of complexity, projects may result in:
- Fully developed, digitally encoded fonts released under open-source licenses;
- Near-complete fonts with temporary encoding, awaiting definitive Unicode encoding;
- Vector-based glyph drawings to formalize reference characters for ongoing Unicode proposals;
- Vector transcription models of specific forms within studied scripts, to help design future fonts.

5. Dissemination

Since 2018, the Missing Scripts team publishes on a regular basis a poster which presents the world's writing systems, in the history of mankind, in chronological order. The data is established with help of SEI Berkeley, and peer-reviewed. It consist of:

- The list and names of the scripts;
- Their region and periods of use;
- The selected reference glyph to represent the script;
- The design of this reference glyph;
- A color code indicating the script's status: living or historical, encoded or not.

In 2018, for Unicode 11, the first edition of the poster listed 292 scripts. At the time, Unicode included 146 different scripts, for a total of 137,374 characters. And 146 scripts out of 292 were missing from Unicode: exactly 50% of the total. In 2023, the poster presents 161 scripts encoded in Unicode 15.1, for a total of 149,186 characters.
The database is also available on the website https://www.worldswritingsystems.org, which provides access to key sources for each script. Both the poster and website were designed by Johannes Bergerhausen at the Designlabor Gutenberg, Hochschule Mainz, while the ANRT team is responsible for the typeface design.
These documents aim to draw attention to the diversity of scripts, and the important role of encoding and typeface design in preserving them. Thanks to this joint effort within the Unicode Consortium, coverage of the world's writing systems is increasing. Along with the Script Encoding Initiative, the Missing Scripts program contributes to this effort by supporting the encoding process and developing functional digital fonts for these scripts, newly integrated into the digital world.

6. Process

It is our responsibility not only to make these fonts as accessible as possible, but also to achieve the highest quality and scientificity in designing it. Indeed, these fonts are often the only ones available for these scripts, and in fact become models.
Along the way, very specific expertise has been developed and improved at ANRT. It brings together different areas of expertise: Linguistics [A], computer sciences [B] and typeface design [C], represented in this Venn diagram.

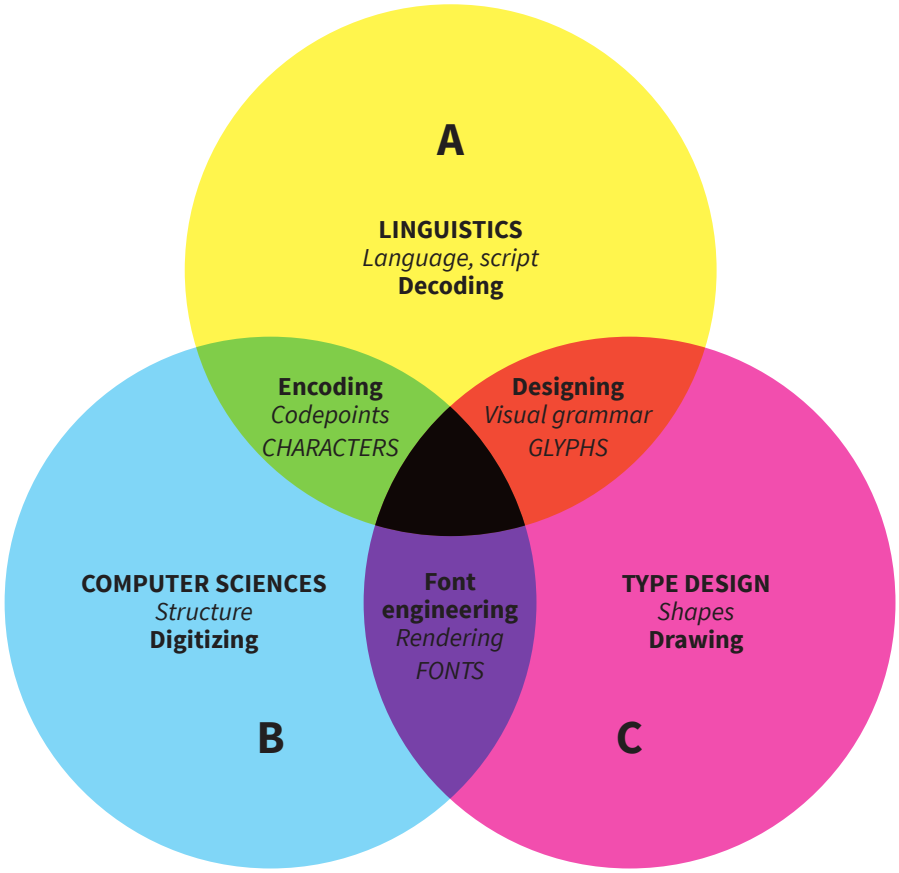

Figure 1. Diagram showing the interactions of the different areas of activity involved to encode a script, design a typeface and produce a font.

- Most of the time, it is mainly [A] and [B] who collaborate in the encoding process. For historical scripts, historians or archeologist may replace the linguists, but the idea is the same: first decode language and script, then encode characters, using the appropriate structure. A specific codepoint is allocated for each character.
- On the other side, between [A] and [C], typeface designers operate at a glyph level: according to the Unicode terminology, the visual representation of a character[2]. It's not only about drawing shapes, but also understanding the visual grammar of a script. This aspect can be decisive: designing a typeface is much more than digitizing a script.
- The third pair [B] and [C], operates at a font level, between computer sciences and typeface design. A close relationship is needed between engineers and designers when addressing problems of rendering or font programming.

7. Digital empowerment

By securing their presence in the digital realm, the Missing Scripts program strives to preserve and protect the rich diversity of the world's writing systems. This effort extends

[2] *https://www.unicode.org/glossary/*

beyond ancient scripts to include living, minority, and indigenous scripts—many of which remain unencoded or inaccessible to modern users.
Designing fonts for indigenous scripts is an essential issue of digital empowerment. Without proper encoding, the publication and exchange of digital texts is impossible. Supporting the development of fonts for indigenous communities and minority languages can have a significant impact on literary production for the communities themselves, as they can benefit from having tools —fonts— that can help the massification of their culture. Without it, the construction of vital datasets essential to current technologies, such as automatic translation, voice recognition, machine learning and AI becomes unattainable. It was therefore a natural progression for The Missing Scripts project to join hands with the International Decade of Indigenous Languages (IDIL 2022-2032)[3], launched by UNESCO in December 2022 to draw global attention to the plight faced by numerous Indigenous languages[4].

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[3] *https://idil2022-2032.org*

[4] *https://www.unesco.org/en/articles/digital-preservation-indigenous-languages-intersection-technology-and-culture*

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Video Games: Innovative tools for Communication and Media Trust

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Introduction

Media and journalism play a crucial role in the transmission and interpretation of reliable information, especially in today's era marked by geopolitical conflicts and the influence of social media. With their interactive nature, video games present an emerging platform for raising awareness about ethical and societal issues.

Objectives

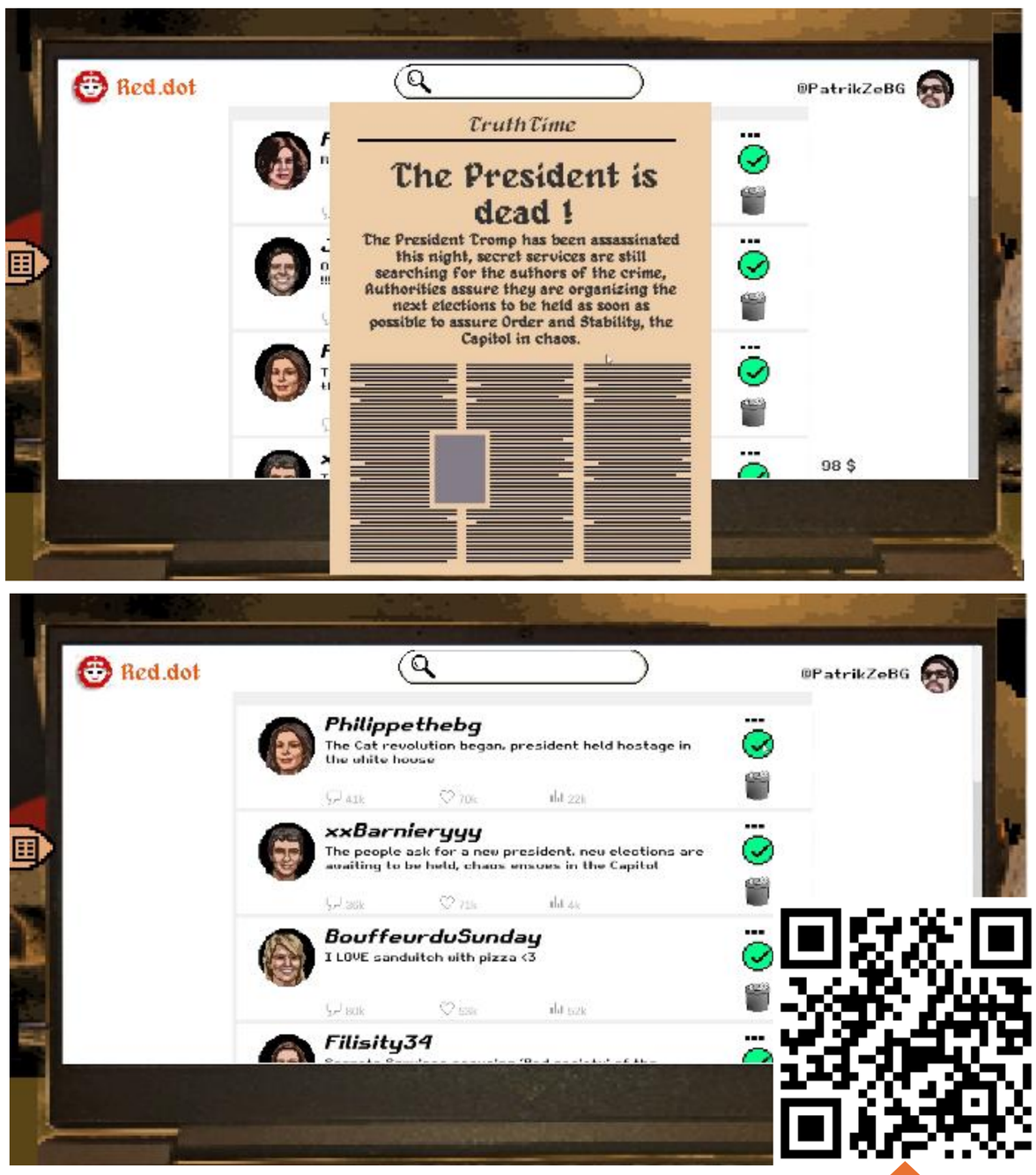
This work aims to simulate **real-world media dilemmas** using **gameplay mechanisms** designed to foster critical thinking. The objective is to encourage players to consider the consequences of their decisions in media and journalism. To achieve this, **two video game prototypes** were developed using the **Unity engine**:

Video Game 1 : *Picture Perfect*

Players embody a journalist tasked with capturing pictures of situations around the city. They can choose to represent these situations honestly or manipulate the story and attract a larger audience. The art direction is a Cartoon Cutesy style to bring a light and humorous tone while subtly addressing serious topics

Video Game 2 : *The president is dead*

Players act as moderators of a social media platform, and every day they receive a newspaper containing only truths. Their job is to fact-check the posts on the platform if they wish to be paid and survive. The game is modular and allows non-programmer users to integrate easily new contents.



Conclusion

This project illustrates the potential of game design as a conducive tool for conveying informational challenges through **gamification and simulation** of real-world media issues encountered by professionals.

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DESIGNING CONNECTIONS: STRATEGIES FOR ENGAGING YOUNG DESIGN RESEARCHERS

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ABSTRACT | This study investigates the role of technology-facilitated professional networking in advancing early academic careers in design research. With the proliferation of conferences and publications, effective networking has emerged as a crucial element for knowledge exchange and collaboration. However, the current digital networking landscape often blurs professional and personal boundaries, which can limit engagement for early-career researchers. This research focuses on the viewpoints of these early-career individuals, emphasizing the influence of digital networking on their professional endeavors, how they utilize technology to their advantage, specific needs not being met by existing platforms or desirable features frequently neglected. The objective was to identify essential features that could serve as the foundation for a new networking platform that empowers this particular group. Employing a mixed-methods approach, the study reviews existing literature on digital networking and conducts a brief survey among PhD students to ascertain their needs and preferences concerning the current digital networking landscape. Findings reveal that respondents are concerned about the merging of professional and personal boundaries, the credibility of information, content quality, and digital inclusivity. They collectively express a need for more transparent and inclusive services, improved visibility, and trust in information. Additionally, they seek enhanced control over content and more free opportunities to promote their projects. Overall, the research suggests that addressing these could have a transformative effect on digital networking, benefiting both their professional growth and the broader design research community, ultimately contributing to a more engaged academic network.

KEYWORDS | Participated Networked Scholarship, Digital Professional Networks, Early-Career Academics, Design Research, Community Building, User Experience

1. Introduction

The community of design researchers is expanding in the digital era, yet it is also becoming increasingly fragmented. Conferences like Cumulus represent one of the few remaining opportunities for personal interaction. Both active and passive networking at these events fosters a degree of engagement and knowledge exchange among both novice and experienced participants, often sparking inter-institutional collaboration, research partnerships or others. Regardless of the specific outcomes, such face-to-face interactions appear to encourage future participation and foster a sense of continuity among attendees. In the absence of these events, relationships are typically sustained through digital means; however, these online platforms frequently blur the lines between professional and personal life, struggle to meet user needs, or lack essential features. Given this context, the present study explores whether design can facilitate a reimagining of our online interactions and connections, enhancing the ways we share and engage with one another. Knowing so, this study asks if design can help to cultivate a more cohesive digital community through interaction design that prioritizes meaningful engagement and improved knowledge sharing?

In pursuit of this objective, the present preliminary investigation gathers insights aimed at developing a digital platform designed to facilitate the integration of early-career academics and strengthen connections within the design community. This platform would enable users to engage dynamically, explore a diverse range of individuals and opportunities within their discipline, foster discussions, and promote engagement and mutual support. A collaborative and supportive atmosphere is essential for academic networking, which seeks to share best practices, discuss methodologies, exchange research insights, and formulate funding proposals (Hewlett, 2018). Given the increasing pressure to develop research projects and secure funding, the demand for tools that encourage collaboration and knowledge exchange is both timely and critical. Individual research endeavors often necessitate mentorship, training, human resources, and financial support; however, identifying or accessing these resources without a reliable network can prove challenging. This project aims to delineate features that facilitate the search for collaborators while promoting both individual and institutional expertise and interests. Collaborations between institutions are crucial for enhancing visibility and generating new creative opportunities. Moreover, as noted by Hedges et al. (2021) in their examination of cross-institutional collaborative research, a well-defined branding strategy to raise awareness of expertise can effectively enhance collaborations. In contemporary academia, not only do institutions require branding and promotion, but the phenomenon of personal branding (Gorbatov et al., 2018) also necessitates that we apply similar principles to individual academics seeking self-promotion as a strategy for career advancement.

The initial phase of this endeavor involves a comprehensive understanding of the experiences, needs, and desires of emerging design researchers. The objective is to gather insights on how our community can effectively support their integration, as well as to identify the essential options, tools, or features necessary to enhance research synergies and collaborative opportunities. The existing body of literature provides a broad overview of this domain, addressing its significance, the stakeholders it serves, the current support networks for early-career professionals, the benefits and challenges faced by their members, and the research gaps that design can address. Following this, a survey was conducted among PhD students enrolled at the Design School of Xi'an Jiaotong-Liverpool University (XJTLU) to ascertain the platforms they predominantly utilize and the unmet needs they experience. This marks the preliminary stage of the project, with the

aspiration that upon completion, it will empower young researchers with improved tools for self-promotion, networking, and the identification of opportunities within their respective networks to foster potential collaborations. The process of seeking and engaging with future research partners from diverse fields or with specialized expertise is anticipated to become more streamlined and effective, ultimately leading to enhanced outcomes.

2. Literature Review

2.1. Design Community

When we talk about an academic community, we generally refer to a group of people in higher education who commit to education, research, participation in academic events, and collaboration with the industrial, cultural or governmental partners to advance and promote knowledge of a specific discipline. In case of design-related studies, this community will include the following groups: designers, design educators, researchers, students, and professionals working in academic institutions or research organizations. As of today, design in the academic context has significantly advanced its vision, approaches and methods as a response to the industrial, technological, cultural, and social developments. In 2008, Kyoto Design Declaration promoted the "ideals of democracy, equality, and freedom of movement", marked the shift from the materialistic values towards human-oriented, intellectual, and less materialistic values, established design as "means to create social, cultural, industrial, and economic values by merging humanities, science, technology, and the arts," and declared commitment of designers to the ideals of sustainable development. In addition to that, design research has been widely recognized as a means to address the complex challenges of our life and a driving force behind transformation (Michel, 2007). Eventually, with the popularization of Design Thinking and the idea of diffuse design performed by everybody (Manzini, 2015), creativity is now seen as accessible value for anyone who aims to achieve innovation.

Academic communities share and promote their values at different scales through individual lectures, educational and research programs, inter-institutional exchange programs such as Erasmus, professional competitions and exhibitions, and local and global associations, such as Cumulus Association, DESIS network, among others. The academic community of designers fosters an environment that encourages critical thinking, exploration of design theories and methodologies, and the application of research to design practice. It provides a platform for designers to advance their skills, develop innovative design solutions, and contribute to the broader design knowledge base. Through the promotion of common values across various touchpoints, academic design networks serve as facilitators for enhancing accessibility to the global design vision and its application in relation to the objects we create, our interactions with technology, the society we influence, and the future we envision. The subsequent section will address online networking, examining the challenges and advantages it presents to emerging researchers. The objective is to explore how design can improve the digital professional networking environment, particularly from the viewpoint of this distinct demographic.

2.2. Professional Networks and Digital Scholarship

In order to address the question of improving the use of professional networks assisted by technologies for advancing early academic career, we first start with some definitions

relevant to our purposes.

The concept of professional communities and networks has its roots in social capital theory (Bourdieu, 1986), which states that social relationships and networks are essential for accessing resources, information, and opportunities. In the context of early career professional development, professional communities and networks have been linked to career success, job satisfaction, and organizational commitment (Eby et al., 2012). In current research, networking is defined as building, maintaining, and using relationships to enhance career success through granting access to resources and facilitating working activities (Ansmann et al., 2014). Online tools for networking which allow users to create a profile and make connections with others are called Social Networking Sites (Boyd & Ellison, 2007; Jordan & Weller, 2018). In our research, we are interested in the academic use of such networks which is related to the advancement of scholarship and career. The term "Networked participatory scholarship" which was proposed by George Veletsianos and Royce Kimmons (2013) is used to refer to the studies of the online participation in social networking sites with the aim to develop scholarship. Scholarship is understood according to Boyer's framework of scholarly activity (1997): Discovery, Integration, Application and Teaching, – where Discovery refers to building new knowledge through traditional research; Integration to interpreting the use of knowledge across disciplines; Application to aiding society and professions in addressing problems; and Teaching to studying teaching models and practices to achieve optimal learning. In its turn, "digital scholarship" is concerned with how the internet and digital technologies are transforming scholarly practice and focuses on the potential of such tools (Weller, 2011). Thanos (2014) in the article on the future of digital scholarship mentions that "modern scientific communication should be characterized by modularity […] A scientific article will be composed of a certain number of "information modules" meaningfully connected by relationship" (p. 23), and characterized by the emergence of the "linked scientific data spaces of disciplinary or interdisciplinary scope" (p.24). In other words, ten years ago, researchers envisioned a world where scientific literature and data are online and interconnected thanks to the support of advanced online services and tools (Thanos, 2014; Gray et al., 2002).

Academic networking is recognized to be helpful for academics at different levels of their career, for example graduates can use it to find a job, assistant and associate professors network to seek collaborations and future job opportunities, and full professors can engage in mentorship and employ the novel skills of their mentees (Ansmann et al., 2014). As mentioned before, in this article, we want to explore how academics in early career use Social Networking Sites linked to their respective professional communities (i.e., Design field) to enhance academic career success and advance their scholarship, and we will refer to the understandings of relevant terms, such as "networking" or "digital scholarship", according to the definitions provided above.

Today, we can find several specific services that benefit academics in their early careers. For example, the European Association for Communication in Healthcare (EACH) supports early career academics with different forms of designated activities. For instance, a five-day "Junior Investigator's Workshop" that aims to exchange ideas and discuss challenges within their current work with the support of experienced senior researchers; "Pairing with Colleagues" program that allows them to discuss their research and teaching with more experienced academics during the annual conference; a designated committee for peer-to-peer support; and a grant that the early career academics can use for the purpose of writing retreats (Ansmann et a;., 2014). A small group called FRiENDs (Female Researchers in Education Networking and Dialogue) evolved as a "writing retreat" providing a peer mentoring environment and a protected space where early academics

can discuss failures and challenges without jeopardizing the professional reputation and can build the balance between "structure and flexibility, and between personal, professional, and emotional support" (Pegg et al., 2014, p. 52). In their article, Pegg et al. (2014) recommend formalizing informal networks to provide more consistent support for early academics, and the safe space they created provides a good example for young academics to overcome initial professional challenges. Within the design community, we can highlight Cumulus Association that has a service for PhD students, encouraging them to publish short papers to stimulate discussions and receive feedback on their ongoing research. This service is a mix of peer and non-peer support, as experienced academics review papers and peer feedback is obtained during presentations. NERD (New Experimental Research in Design) is a series of conferences that discuss design research practices produced by advanced graduate students, doctoral candidates, and early-career postdoctoral researchers. Design Research Society conducts biannual conferences and other initiatives, including discussion forums for PhD studies available for their members. DESIS Network has its "DESIS students" network that promotes students' initiatives about design through online meetings, yet it is not explicitly designed to advance early career but rather to engage in a design community that shares values of design as a means for social innovation and sustainability. JiscMail PhD-design list provides a platform for discussing "PhD studies in design and related research, teaching and supervision" and announcing research requests and opportunities. These are some examples of the opportunities for early career academics that can facilitate the integration with the international design research community. Some of them include online forms of participation, others more traditional onsite forms of participation.

Literature suggests three levels of participation: attendant, information provider and co-producer (Rodríguez-Rad & Rio-Vázquez, 2023). In our research, we focus on the attendant's and co-producer experience of using Social Networking Sites to advance their career and scholarship.

Jordan and Weller (2018) in their study on the benefits and problems in professional engagement with online networking qualitatively analyzed a dataset published by Nature Publishing Group (Research, Nature 2014), and they have noticed that the tendency among academics to report on the problems rather than benefits of online networking. They also compared their results with the results shared by Lupton (2014) on the same topic, and found that whilst there is an overall consensus about the benefits, there is less agreement in relationship to the problems between the two studies.

The benefits, as identified by Lupton include making connections and developing networks, openness and sharing, self-promotion, research, teaching, and support; the benefits as identified by Jordan and Weller include benefits for younger academics, directory of academics, discussions, dissemination, finding information and papers, finding potential collaborators, helping others, improving scientific process, raising own profile, recruitment and opportunities, staying up-to-date, supporting multiple profiles, and tracking impact. According to their studies, dissemination was the largest category of benefits reported by the academics.

Problems, as identified by Lupton included privacy issues and the blurring of boundaries, lack of credibility, concerns regarding quality of content posted, time pressure, excessive self-promotion by others, plagiarism, the risk of jeopardizing one's career, social media use becoming an obligation, and becoming a target; and Jordan and Weller identified the problems as concerns about commercialism, digital inclusion issues, digital literacy issues, restrictions on use imposed by institution, sites are not perceived as useful, preference of other types of networking, concern on privacy and security, social aversion,

spam, time concerns, plenty of sites, unreliable information online. The two biggest concerns reported by the academics were time concerns and the perceived uselessness of social networking sites. Regarding the latter, Donelan (2016, in Jordan & Weller, 2018) commented that "academics who engage more frequently, with a higher number of social media tools, tend also to have a wider range of motivations for using them, and experience a greater number of successful outcomes" (Donelan, 2016, p.727).

What rests underexplored is how the online platforms technologies are being used by the academics and the problems associated with that (Jordan & Weller, 2018). The role of design in digital scholarship is also insufficiently researched. Burdick and Willis (2011) explore its role at a theoretical level and see Design Thinking as a "point of connection between digital learning and digital scholarship" (p. 549) and as a mean of innovation for curricula, pedagogy, etc. However, no recent studies discuss the use of online professional platforms from a design perspective.

3. Methodology

The findings of this research study are based on primary data obtained through a mixed methods approach, which integrated both qualitative and quantitative data gathering inputs via an online survey administered from mid-January to early February 2025. The purpose of the data collection was to address three critical questions, thereby enhancing the practical implications of this research initiative. The questions are as follows:

- **RQ1.** What are the essential requirements of early-career researchers concerning digital networking and the establishment of professional relationships, and how effectively do current platforms meet these needs from their viewpoint?
- **RQ2.** Which online platforms do young academics prefer for career advancement or scholarship opportunities, and what specific features do they consider most important?
- **RQ3.** What gaps exist in the current digital networking platforms, and how might design improvements enhance user experiences and interactions online?

The study's aims and objectives warranted a focus on postgraduate students who are presently engaged in doctoral-level programs. Consequently, the sampling approach employed was purposive (judgmental) sampling, which targeted individuals who met these specific criteria and were also reachable through the researcher's established digital networks.

To answer each question, researchers selected an online survey as the primary method for data collection, which permitted the implementation of standardized questions, thereby minimizing variability in interpretation and responses. This approach also enabled access to a broader demographic of potential participants, including those who were geographically dispersed, ultimately enhancing the capacity for data comparison and analysis. The survey was structured into three distinct sections. The initial section concentrated on the demographic characteristics of the participants. The second aimed to establish a digital baseline, allowing researchers to assess the extent of participants' familiarity with and utilization of current digital networking platforms or services. Finally, the third section investigated the expectations of participants, particularly young researchers or academics, regarding such platforms or services.
Participants were recruited by email. The email content detailed the study's objectives and the rationale for their involvement. It concluded with an URL link that directed recipients to the online survey; the landing page reiterated the study's objectives and emphasized that participation was voluntary and that all results would remain confidential. Advancing to the subsequent page was interpreted as consent to

participate. All questions included in the survey received ethical approval from the Xi'an Jiaotong-Liverpool University Ethics Review Panel (No.: ER-LRR-00100000897202501210815 40), with a total of 14 participants (n=14) completing the survey. The sample does not adequately represent the broader population due to its limited numbers, geographical and cultural diversity; nonetheless, it is deemed sufficient for drawing context-specific conclusions relevant to this study and new research pathways.

Data analysis focused on descriptive statistics and qualitative insights. Quantifiable responses were summarized, calculating frequencies and percentages for categorical responses. Some are resumed and offered in a table while others take a graphic format. Thematic analysis was used for qualitative analysis as to identify recurring themes or patterns, and participant quotes were used to illustrate findings.

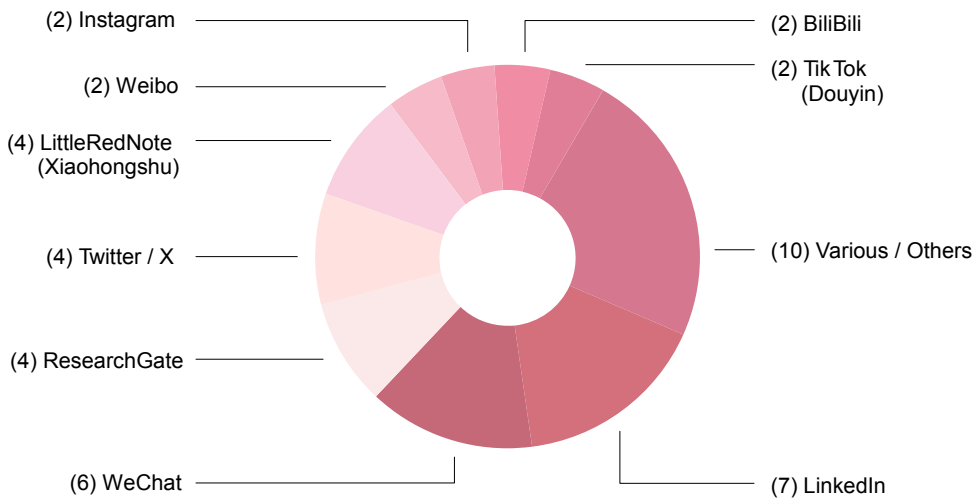
4. Results

4.1 Demographics

A total of 14 individuals (n=14) completed the survey in its entirety. In terms of gender distribution, there were 9 male respondents and 5 female respondents. The participants' ages ranged from 24 to 35 years, with the highest concentration in the 24 to 26 age group (6 participants), followed by the 27 to 29 age group (3 participants), the 30 to 32 age group (3 participants), and finally, the 33 to 35 age group (2 participants). With the exception of two natives from Nigeria and Indonesia, all other participants were Chinese nationals. The research expertise of the participants is categorized into three main fields: Urban Planning (7 participants), Design (4 participants), and Civil Engineering (3 participants). All participants are currently residing in Suzhou, China, and are pursuing their PhDs at Xi'an Jiaotong-Liverpool University (XJTLU).

4.2 Digital Baseline

When participants were requested to enumerate the digital networking platforms to which they were currently subscribed, their answers varied significantly across a spectrum of social networks. The inquiry did not specify any particular platforms for selection; rather, it offered an open-ended format to accommodate responses that might extend beyond the researchers' familiarity. The responses were as shown in Graph 1.



Graph 1. Digital networking platforms currently subscribed to.

The subsequent inquiry focused on identifying the platforms in which participants were

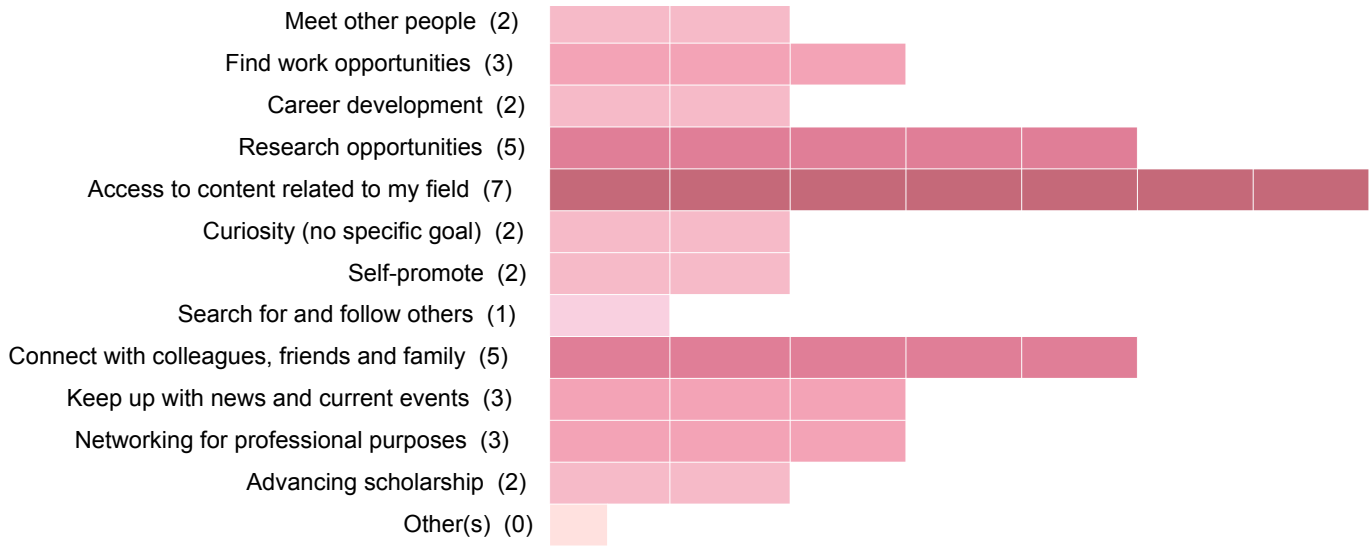
most active, with WeChat emerging as the leading choice. Following this, participants were questioned regarding their weekly usage hours on these platforms. The most common response was between 4 and 8 hours (5 participants), followed by "less than 1 hour" (3 participants) and "between 9 and 16 hours" (3 participants). Additionally, 2 participants reported spending "between 1 and 3 hours," while only one participant indicated spending "more than 24 hours."

Participants were subsequently queried regarding their perception of digital networking as an essential skill for enhancing career opportunities, and they were invited to provide brief insights reflecting their views on the matter. Two individuals responded negatively to the inquiry, while one expressed uncertainty. Among the negative respondents, only one provided a rationale, stating that the significance of digital networking "depends on the environment and timing," without further elaboration. In contrast, twelve participants affirmed the importance of digital networking, with the majority contributing additional commentary. Some responses highlighted that "digital networking can assist in locating numerous valuable papers," while another participant asserted that:

> — "digital networking is indeed a critical skill for improved career prospects. In today's interconnected world, the ability to effectively network online can lead to new opportunities, collaborations, and mentorships. It allows professionals to expand their industry connections, stay updated with the latest trends, and showcase their expertise to a broader audience. Digital networking through platforms like LinkedIn, industry-specific forums, and social media can be a powerful tool for career advancement and personal brand development."

Additional comments included observations such as, "it opens many opportunities I wouldn't get only by physical networking. Also, it's free," and "there is a wealth of information available, and someone could provide suggestions for you."

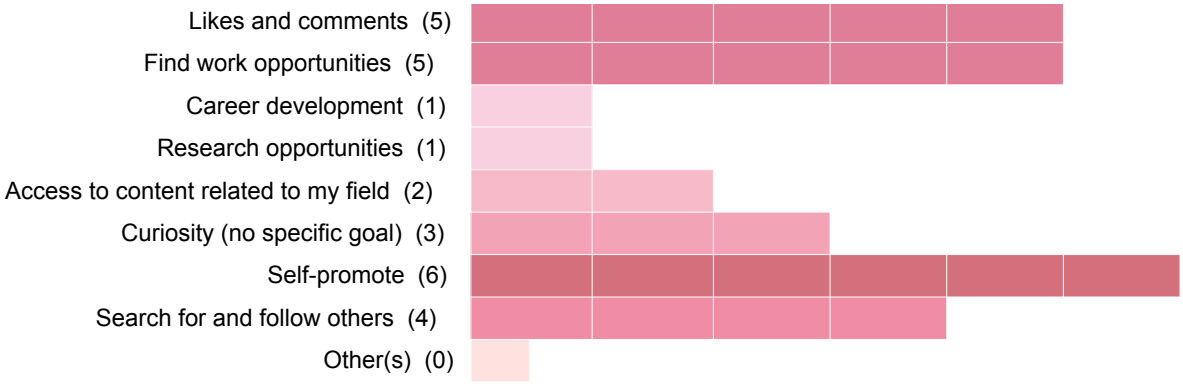
Responses regarding the motivations for joining digital networking platforms exhibited considerable diversity. Participants were presented with a list of twelve distinct options, along with an open-ended response field, allowing them to select up to three choices. The predominant motivation identified was "access to content related to my field" (7), closely followed by "research opportunities" (5) and the desire to "connect with colleagues, friends, and family" (5). A comprehensive summary of the results is provided below in Graph 2.



Graph 2. Motivations for joining digital networking platforms.

The question that followed asked which digital networking aspects did they find most

enticing or pertinent to their employment goals. As previously, participants could select three different options from a list of nine or write an additional in an open field. "Groups and communities" was the most frequently chosen response (6), followed by "direct messaging" and "likes and comments" (5 each), and "content share". None used the open field to add features that were not listed. The complete results are displayed in Graph 3. Next, participants were confronted with a series of statements about their knowledge and use of digital networking platforms/services, and asked to rate these on a 5-point Likert Scale. Statements and results are shown in Table 1.



Graph 3. Most enticing or pertinent features to their employment goals.

Table 1. Participant use and believes about digital networking platforms/services:

	5-point Likert scale					Total	Weighted Average
	1	2	3	4	5		
a. I believe digital networking plays a critical role in early career development	0.00% 0	0.00% 0	14.29% 2	**64.29%** **9**	21.43% 3	14	4.07
b. I feel like I have to join these platforms, even if I see little or no value in it	7.14% 1	21.43% 3	14.29% 2	**42.86%** **6**	14.29% 2	14	3.36
c. Digital networking platforms are a great way to connect and being connected to other people	0.00% 0	0.00% 0	21.43% 3	**64.29%** **9**	14.29% 2	14	3.93
d. I have developed and nurtured strong professional relations through digital networking platforms	0.00% 0	21.43% 3	**42.86%** **6**	**35.71%** **5**	0.00% 0	14	3.14
e. Having an online presence allowed for others to contact me to explore or discuss various types of projects	7.14% 1	7.14% 1	28.57% 4	**42.86%** **6**	14.29% 2	14	3.50
f. I have reached out to others using digital networking platforms to discuss past or on-going projects	0.00% 0	21.43% 3	**28.57%** **4**	**28.57%** **4**	21.43% 3	14	3.50

g. I have created and established strong professional links through digital networking platforms	7.14% 1	14.29% 2	21.43% 3	**57.14%** **8**	0.00% 0	14	3.29
h. I only browse these platforms for news feed and updates and rarely interact with others	7.14% 1	**28.57%** **4**	7.14% 1	**35.71%** **5**	21.43% 3	14	3.36
i. Since joining this type of platform I have developed feelings of self-doubt and low self-esteem	7.14% 1	**28.57%** **4**	**35.71%** **5**	**21.43%** **3**	7.14% 1	14	2.93
j. I leverage these platforms to participate in academic discussions or research groups	7.14% 1	7.14% 1	28.57% 4	**50%** **7**	7.14% 1	14	3.43
k. I actively engage with other people on these platforms who are active in the same field of research as me	21.43% 3	0.00% 0	7.14% 1	**71.43%** **10**	0.00% 0	14	3.29
(**1**) Completely Disagree, (**2**) Disagree, (**3**) Neither Agree nor Disagree, (**4**) Agree, (**5**) Completely Agree							

The final inquiry in this segment of the survey sought to determine whether participants utilize or are aware of any services tailored specifically for young researchers. The findings indicate that a significant majority are unaware of such services (9 participants), while a smaller group (5 participants) responded affirmatively. Those who indicated familiarity were subsequently asked a follow-up question, requesting them to identify the platform or service and to provide insights regarding their experiences with it. Some of their notes included "ResearchGate: An online portal where researchers can share their publications, connect with colleagues, and seek collaboration. It's particularly useful for young researchers to gain visibility and engage with the scientific community", "LinkedIn, Research ID (ORCID, Scopus, etc.), X -- So far, it has allowed me to get conferences and workshop information outside China and my home country" and "LinkedIn: easy to find similar perspectives."

4.3 Expectations as a young researcher or academic

The subsequent segment of the survey commenced with an open-ended inquiry directed at participants regarding their expectations or requirements that were not being met by the current platforms. Although a subset of participants either could not identify any unmet needs or expressed contentment with the available options (5), the others provided valuable suggestions for enhancements that could improve their experience. Some note these platforms could "list of scholars who provide information on research projects or wish to cooperate", others mention wanting to see or find "job opportunities" or being able "to collect all the available university position in University", have and access "online seminars for academic discussions." One respondent expanded a bit further and elaborated on the need to have a channel or option for "Feedback and Peer Review: There is a need for more effective and constructive feedback mechanisms and alternative peer review processes that can help young researchers improve their work."

This initial inquiry was succeeded by a related question that sought to explore how these platforms could enhance their support for academic careers. While not all participants

contributed, those who did (8) highlighted various features, including “access to academic journals”, “assistance in locating job or research opportunities”, “dissemination of targeted calls for academic publications”, “provision of early career pathways”, “recommendations for appropriate job opportunities”, and even the “option to disable notifications after work hours to reduce contact.”

In response to the previous inquiry, participants were prompted to identify what they perceived as the most significant drawbacks or shortcomings associated with this type of platform or service. The responses were diverse, highlighting issues such as limited interactivity, with some noting that "the platforms may not provide sufficient opportunities for substantial interaction beyond mere likes and comments, which can hinder the depth of engagement and collaboration." Additionally, concerns were raised regarding the lack of flexibility, as exemplified by comments on platforms like Academia and ResearchGate, which were described as having a rigid user interface that might deter non-academic users. Other participants expressed worries about "information privacy," citing "privacy issues, inadequate content quality control," and the inability to "aggregate all researchers," emphasizing that these platforms often operate on principles of "exclusivity and gatekeeping of information."

In examining the user experience associated with this platform, researchers sought to understand its potential influence on career development. The responses from participants were categorized into two distinct groups: neutral (4) and positive (10). Those in the positive group exhibited greater expressiveness and were more inclined to provide detailed insights regarding their experiences. One participant noted the platform's capacity to "share and promote progress on personal and professional projects to a wider audience," while another remarked that "individuals can easily connect with one another, facilitating work around the clock; this is certainly beneficial for professional endeavors, but it may not be conducive to personal life." The most insightful answer notes that operating through these platforms

> — “has expanded the reach of professionals, allowing them to connect with peers, mentors, and opportunities across the globe without the limitations of physical distance. For some, it has led to collaborative research projects, job offers, and the ability to build a strong professional brand. However, the impact can vary depending on the individual’s ability to navigate these platforms, the quality of their network, and the effort they invest in maintaining and leveraging their digital connections.”

The final inquiry in the survey prompted participants to share any additional thoughts regarding digital networking that might contribute to this research. While most chose not to provide further comments, two individuals did suggest that enhancing "algorithmic transparency" would be advantageous, as they frequently express apprehensions about data utilization on networking platforms. They emphasized that comprehending the algorithms that dictate content visibility is essential for users to maximized their engagement with these platforms. Additionally, they advocated for a more effective balance between online engagement and real-world networking, and raised concerns about the potential for an information cocoon effect resulting from prolonged usage.

5. Discussion and Conclusions

The findings, although limited, offer insights into perceptions and viewpoints that postgraduate students hold regarding contemporary digital networking services and platforms. It is noteworthy that, in digital networking, participants believe that any platform

will do, irrespective of its primary focus on social or professional interactions. The most important is to have an online presence. Some users effectively merge both dimensions, utilizing the same platform for diverse purposes, although it is unclear how practical this approach is on digital scholarship.

The importance of maintaining an online presence and being accessible is widely acknowledged, regardless of the time and effort required. Participants appreciate the ability to locate and connect with others on these platforms, share information, engage in direct messaging, join groups or communities, and disseminate content; they consider these features to be valuable resources. Nevertheless, whether participants actively utilize these functionalities for personal branding, career advancement, academic opportunities, or other objectives remains unclear. While there is a general agreement that these platforms and their related activities may impact their future, it is apparent that simply joining these networks is a minor step; the more significant challenge lies in comprehending how to effectively harness the advantages these platforms offer for personal gain. Responses indicate a lack of thorough understanding regarding how to leverage these tools beyond basic social interactions to improve their chances of obtaining positions in academia and research or achieving greater visibility. Consequently, postgraduates in digital networking navigate this landscape independently, with many uncertain about the steps or actions necessary to utilize this resource effectively. A trial-and-error approach seems to dominate; however, this can quickly become a time-consuming endeavor without any assurance of a beneficial outcome, prompting researchers to question whether postgraduates should receive training in digital networking skills to complement their academic programs.

One participant notably raised an additional concern that exacerbates the “trial and error” approach, specifically regarding algorithmic transparency. The lack of clarity surrounding the operational mechanisms of these algorithms complicates the comprehension of how content is prioritized, promoted, or suppressed, thus rendering self-promotion particularly difficult. Moreover, the regular updates to these algorithms imply that even those who attain success may experience it as a transient achievement. This scenario invites a critical examination of whether platforms ought to be more transparent about their algorithms; however, it remains uncertain whether such transparency would lead to beneficial or detrimental effects and how this information could be effectively conveyed to users. Despite the abundance of accessible networks for participation, many users express that these platforms often lack comprehensive features that could benefit postgraduates and researchers. Participants indicated a desire for enhanced visibility regarding scholars interested in collaboration and information pertaining to ongoing research projects. They also seek improved control over the content displayed in their feeds, the introduction of channels dedicated to seminars and discussions, and mechanisms for feedback and peer review. These features are perceived as potentially beneficial for the digital scholarship of postgraduate students, yet they remain either absent or unknown to the users.

In the literature review, we introduced the term “Networked participatory scholarship,” which refers to online participation in social networking sites to develop scholarship. The results of our primary research show that, in the given context, respondents did not explicitly link the use of digital professional networking sites with scholarship development. In the literature review, we mention that scholarship refers to the new knowledge development (“Discovery”), its interpretation across disciplines (“Integration”), “Application” in society, and learning it through “Teaching” practices – and none of the respondents interpreted the use of digital professional networks in this way.

In reporting on the benefits of using digital networking sites, the highest number of

responses mentioned easy access to information, opportunities for promoting their projects, and the fact that it's free and doesn't require financial investments. In reporting on what those platforms have not yet covered, their expectations revolve around establishing meaningful connections, finding job opportunities, and targeted calls for academic publications. Some more insightful answers included a request for an alternative peer review process with more transparency and inclusion, facilitation in getting replies from others, an option for shutting down the service for off-work time, improved usability of the platforms, and specialized online seminars. We can summarize that the respondents' expectations regarding the use of digital professional networking sites are about establishing meaningful professional connections and experiencing well-designed, transparent, and inclusive services. Among those, obtaining feedback, transparency, and the need in online seminars can be interpreted as "discovery" and "teaching" from the "scholarship" definition. At the same time, its "integration" and "application" were not covered by the respondents. In that sense, it opens for us opportunities to explore why these aspects remain out of the respondents' interest and how good design can help young academics become aware of the academic career advancement process driven by and towards scholarship advancement. In the literature review, we find some offline and online activities designed to help young academics advance their scholarship. "Teaching-" oriented activities, such as writing retreats by FRiENDs, online seminars by DESIS students network, and workshops on early career challenges by EACH; "Discovery-" oriented activities, such as designated funding for young academics by EACH and PhD Network by Cumulus Association. Designing a platform that would accumulate these opportunities and provide tools for proposing and sharing new opportunities of this kind can become a new service for promoting the values of the academic design community and the opportunities for scholarship advancement.

In conclusion, we would like to provide intermediate research answers (RA) to the research questions we posed in the methodology section.

RA1 (User Needs): The essential requirement from the respondents' perspective is to establish meaningful professional connections and experience well-designed, transparent, and inclusive services. They look for the enhanced visibility of the scholars interested in collaboration and information on the ongoing research projects. Users seek improved displayed content control, channels dedicated to seminars and discussions, and guiding feedback and peer review.

RA2 (Platform Features): In the analyzed context, the respondents reported that WeChat is the leading platform for career advancement and scholarship opportunities. The respondents pointed out such features as "groups and communities," "content share," "direct messaging," and "likes and comments" as most important in that platform. They appreciate easy access to information, opportunities for promoting project with no financial costs.

RA3 (Gaps): The respondents mentioned the following gaps in current digital networking platforms that match those mentioned in the literature review, such as the blurring of boundaries between work and personal life, lack of credibility, concerns regarding the quality of content posted, and digital inclusion issues. New ideas included having access to specialized online seminars for academic discussions, a list of targeted job opportunities and calls for academic publications, off-work time mode, and an alternative peer review process with improved transparency, inclusion, and facilitation in getting replies from others. Eventually, we noticed a missing link between the use of digital professional

networking sites and scholarship development. Currently, the existing platforms partially meet the "discovery" and "teaching" and leave unaddressed the "integration" and "application" areas of scholarship. Taking this into account, a new question arises on whether postgraduates should receive training in digital networking skills to complement their academic programs?

In the subsequent phases of our project, we aim to conduct further research to address the newly evolved questions, such as the reasons behind interpreting participation in online professional networking similar to how they engage with social media networks rather than advancing scholarship. We believe in the importance of promoting awareness regarding the value of scholarship advancement among early-career academics and that there is a strong opportunity to design a platform that would provide services covering all four areas of scholarship as stated in Boyer's model. Design can bridge the gaps in networking and scholarship by employing Research through Design approach. As “Integration” and “application” remain out of the respondents’ interest, we will leverage on the existing examples covering those areas of scholarship, for instance, “Teaching” is covered by writing retreats by FRiENDs, online seminars by DESIS students network, and workshops on early career challenges by EACH; “Discovery” covered by a designated funding for young academics by EACH and PhD Network by Cumulus Association.
In the platform prototype, we also aim to address algorithmic transparency and explore mechanisms for formalizing evolving informal networks. This will allow us to provide unique features specifically designed for the needs of young design academics.

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When we edit ourselves endlessly: HABITAT, a speculative space design based on inconsistent virtual identity.

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ABSTRACT | The Internet has empowered individuals to self-expression with unprecedented freedom. However, digital world has the power to both liberate and isolate. Through qualitative research, it has been revealed that obsession with crafting and maintaining online images may cause cyber-identities to overshadow our actual existence, distorting self-perception from appearance to social relationships.
Set in the future, HABITAT envisions an extreme endpoint of digital identity, where all human features have faded, leaving only an arrangement of bones and musculature. By presenting a world where identities are over-edited, this speculative project invites reflection on the balance between online profiles and embodied realities and reinforces the value of physical identity in an increasingly virtual world. According to interviews with exhibition visitors, this project was effective in evoking critical thinking about virtual selves.

KEYWORDS | Avatars, Virtual identity, Self-discrepancy, Speculative, Self-perception

1. Introduction

According to anthropologist Victor Turner, it is in a time and place of withdrawal from normal modes of social action- which he calls “liminal”- that we can explore our identities most freely. The anonymity of online worlds removes users from their real-life constraints, offering them greater freedom and opportunities to experiment with minimal threat of physical consequences or social exclusion. Today, digital identities have become an integral part of our overall sense of self, allowing individuals to present themselves in new and creative ways that transcend traditional social hierarchies and boundaries. Managing one's digital identity has become a compulsory subject for everyone in today's media world. People enthusiastically engage in various online self-expression activities, such as personal websites, blogs, social networks, and interest-related online communities. People may present a curated or idealized version of themselves online, highlighting their best qualities while hiding their flaws or vulnerabilities - athough this could be inauthentic.

For entertainment, self-identification or psychological needs, humans show a long-standing fascination with changing various aspects of their identity and experimenting with other roles (Gilbert. et al., 2011). In his book The Presentation of Self in Everyday Life (1956), Erving Goffman uses the dramaturgical metaphor arguing that individuals behave like actors in a play, strategically presenting themselves through symbols and interactions to shape others' perceptions. Elaborately made-up digital identities are causing disorientation in self-perception. Some people have developed a stronger identity with their virtual avatars that display their “ideal self” rather than their real self. Additionally, the pressure to maintain a certain online persona can lead to a sense of disconnection or alienation from our real-world selves and relationships.

The dominant discourse on the analysis of the new technologies usually involves the economic, social or cultural spheres while ignoring the subtle but fundamental reorganization of psychology and identity brought by it (Kasza, 2017). As our reliance on technology continues to grow, it is increasingly important to consider the ways in which our digital and real-world identities intersect. We need interdisciplinary methodologies to understand the profound impact of digitization on identity. HABITAT explores the speculative future of avatars based on current concerns about virtual identity, while inviting critical reflection on virtual identity in artistic ways that relate to behavioral norms, values and intentions.

2. Conceptual Framework

2.1. Digital Self-Presentation

Digital identity is more a projection of one's true self than an exposure of it. We think we will be presenting ourselves on social-networking sites such as Facebook, but ends up as somebody else— and it’s usually the ideal version of ourselves. We always underestimate the strong subjectivity of personal information generated by users behind the data. Modifying one's own profile is both instrumental and strategic, as well as a new form of impression management. On the online platforms, people keep their true thoughts to themselves and only ambiguously present a portion of their identity that is likely to attract attention and empathy. People do not present their image in order to – or not only to –

show their true self. When people write their own profile on social media, they are often trying to shape the way others perceive them. Here, digital identity is a process of establishing connections, which ultimately aims to attract others.

Managing virtual identities is not an easy task. As Sherry Turkle said in her book Along Together, In the course of a life, we never “graduate” from working on identity; we simply rework it with the materials at hand. Turkle describes the pressure of socializing with a virtual identity as “presentation anxiety”, such as worrying about getting caught in a fake profile, modifying one's appearance to fit different social groups, and feeling anxious about the attention received. Internet users generally have multiple virtual identities (Gilbert et al., 2011), which undoubtedly adds extra mental effort to everyday life.

Virtual identities have the potential for exploitation. Social networking sites offer possibilities for cataloguing human beings as if we were documents (Ertzscheidcen, 2009)。In the era of big data, digital identity is a commodity itself. The internet is increasingly linked to surveillance technologies, which not only change the relationship between users and information, but also turn individuals into targets of commercial advertising. Furthermore, the psychological, social and political motivations for creating a digital identity are multifaceted and complex. According to Dominique Cardon, the jumble of personal signals spread chaotically on social networking sites is far from providing objective, uncontroversial, verifiable and calculable information. It is merely a collection of banter, parody, irony and exaggeration.

Nevertheless, this trend towards self-expression will not stop. Internet users do not seek stability and permanence in their online image, they simply want to engage in the communication of “attention economy” on an ongoing basis (Kessous, 2012). Our identity moves rapidly and continuously between multiple apps or platforms every day: switching between different social media accounts, checking email one after the other, playing different avatars in multiple games. The rapid cycle of identity switching stabilizes into a sense of continual copresence. Even a simple cell phone brings us into the world of continual partial attention (Turkle, S. 2011). People are so addicted to it that they still proudly display themselves on social networks, even though most internet users do not believe that their privacy is well protected.

2.2. Self- discrepancy of avatars

According to Higgins (1987) self-discrepancy theory, there are three self domains: actual-self, ideal-self, and ought-self. Discrepancies between these aspects of the self causes negative affect, including sadness, disappointment, and dissatisfaction (Li et al, 2011). People are naturally motivated to reduce this emotional discomfort (Green et al., 2020). An avatar is a special way of representing oneself: it symbolizes the user's body in virtual space. Avoiding the actual-self through avatar-self is considered a strategy for reducing self- discrepancy in some cases, although this may worsen the discrepancy with actual-self.

Online gaming activities have become increasingly sophisticated in the types of experiences offered to players, particularly in regard to creating and animating complex characters in immersive environments. Modern gaming characters can be highly realistic or stylized, with many customization options that alter personal attributes, abilities, and appearance. These features are thought to enable players to develop a unique identity

(Przybylski et al. 2012) and provide opportunities to act out roles of who they might aspire or wish to be in real life (King et al, 2019). The tendency of creating distinct digital avatars is usually based on several motives: seeking attention, reducing loneliness and the desire to connect with others, impression management, looking for creative and self-expressive outlets, emotional and sexual desires, and the desire to express hidden aspects of oneself as well as experimenting with different personalities (Gilbert et al., 2011). Several studies (Jin, 2010; Ducheneaut 2009; Bessiere et al. 2007) have shown that users tend to attribute more positive or idealized personality traits to their avatars. Psychologists Mancini et al. (2017) believe that ideal avatars will motivate users to explore and socialize online, but some studies have also shown that this positive avatar modification can also cause cognitive biases: when avatars are superior to real selves in terms of personality and socio-emotional characteristics, people feel significantly more social connected as avatars than in real life (Gilbert et al., 2011).

Numerous studies (Mancini et al, 2019, Looy et al., 2014, Przybylski et al., 2012, Bessière et al., 2007) have shown that players create idealized avatars as a way to relieve psychological tension caused by the perceived discrepancy between the actual self and the ideal self. This explanation is consistent with Higgins' theory. It is almost a psychological placebo: while this way of escapism can briefly blur the user's perception about the flaws in reality, it triggers deeper cognitive issues. Players who consider their identity as being ‘fused’ with their avatars were more likely to be problematic gamers than those who perceived their avatar as being differentiated from their identity. Addicted gamers reported significantly poorer self-concept compared to nonaddicted and inexperienced gamers(Lemenager et al. 2013). Survey-based studies have reported that negative self-concept, avatar identification, and large self-avatar discrepancies are significantly associated with problematic gaming(Green et al. 2020).

2.3. Future identity

Human identity is not fixed and immutable(Gilbert & Forney, 2013). Within the contemporary dynamics of ‘liquid modernity' (Kasza, 2017), identity changes in response to revolutions and developments of culture and technology. Over the past few years, there has been a significant digitalization and internet-based transformation of human activities and social interactions(Lin & Latoschik, 2022). Tech companies such as Meta, Nvidia and Microsoft are investing heavily in metaverse projects, which indicates an enormous market for digital avatars in the future. As the boundary between reality and virtual continues to blur, it is likely that our bodies will inhabit both worlds in the next generation. Creating and coordinating a system of multiple offline and online identities will increasingly become the norm in human development (Gilbert et al., 2011), as experimenting alternative avatars and different identities will become more accessible and commonplace in the future.

Baudrillard (1976) introduced the concept of hyper-reality. He believes that in contemporary culture overload, the intensive production of information by the general public has been deprived from meaning. Postmodern culture is like a party of excess information, which has resulted in even greater confusion and alienation of personal identity. The diversity and complexity of identities will become something of a spectacle once they exceed a certain limit, leading to self-alienation. Real and virtual identities may continue to influence, conflict and compete with each other. The search for identity should not result in the dominance of one's virtual or real self, as the two are not mutually

exclusive. Amidst the restless technological and cultural revolutions, individuals' self-perception is bound to be constantly challenged, and the pursuit of a harmonious balance between different selves will remain a perpetual task.

3. Related Works

In some artistic practices related to virtual identity, artists deliberately create bodily expressions that differ from reality in order to accommodate media art trends or challenge real-life stereotypes. Multimedia artist Jon Rafman constructs digital ethnographies by archiving facial images. In his work Facials I (2022), he explores individual cultural identities in the chaotic online media environment through uncanny and depersonalised portraits combined from 3D scans of human faces and miscellaneous objects. Rafman suggests that these transformed facial images will be evolved into wearable skins for 3D avatars, and will endow users with a vivid character as their screen time grows. Greek artist Theo Triantafyllidis questions the necessity of maintaining a natural-looking body in virtual spaces. He explores the beauty of body modification in numerous works that speculate on transformative body's alternative materiality, texture, colour, and functionality (Qiang, 2023). In Studio Visit 360 (2018), he embodied an Ork avatar, who used digital tools to create 3D forms in his virtual studio that re-imagined from his offline gallery spaceas a challenge against the expected stereotype of an artistic worker.

Figure 1. Jon Rafman, Facials 1 (2022). [Color video with sound, 3 min]

Some artists have criticized the discrepancy in self-perception caused by digital identities with their straightforward visual disclosures. Parade is a fantasy rainy world created by the Rodina Studio, exploring how we construct our identity in a post-representational digital reality. Parade is a carnival of emojis and selfies, questioning the

endless contemporary self-presentation with a dazzling barrage of messages. Nice To Read You(2020) was about showcasing the duality in personality that many of the contemporary individuals of today have, i.e. the self-design on personal social media accounts. Through the combination of passport photos and captions, the artist reveals this elaborate display of managed personal information.

Figure 2. Pierre Huyghe, (2001). One Million Kingdoms. [Color video installation, with sound, 7 min] The Guggenheim Museums and Foundation. Available at: https://www.guggenheim.org/artwork/10700.

In common with HABITAT, Pierre Huyghe in One Million Kingdoms (2001) uses the coupling of virtual images, virtual scenes and narration to demonstrate the tension between fact and fiction. One Million Kingdoms was part of the No Ghost Just a Shell project (1999-2002) lead by artist Pierre Huyghe and Philippe Parreno. In this project, various artists created more than 30 video and literary artworks based on virtual character Annlee. Annlee has no biography, no superpowers, no attributes, no distinctive features. She is like a container of concepts, adapting to various purposes in the works of different artists. (Castellano, T. 2023) In One Million Kingdoms, Annlee walks alone through the shifting digital lunar landscape, with the narrator reciting passages from Jules Verne's novel Journey to the Center of the Earth in a synthesized form of astronaut Neil Armstrong's voice. Everything in this video is fictional: the digital landscape, the synthesized sound, and even the narration of Journey to the Center of the Earth, which is itself a fictional novel. Annlee appears as a translucent outline, like a symbolic null set being filled with these fictions. Through empathy with Annlee, we can feel the vulnerability and instability brought by the virtual. The audience observes the scene from a third-person perspective, and is observed again and gazed upon by the character. This gaze establishes a subtle connection between the character, scene, and audience, and makes the audience start to examine the relationship between the self and virtuality.

4. HABITAT

Imagine the end of virtual identity editing: when we endlessly self-modify, abandoning everything realistic and natural about us until we are no longer recognizable as human. HABITAT depicts a speculative virtual space . Due to the excessive self discrepancy brought about by inauthentic identities, people gradually alienate themselves from their actual-selves, with their avatars no longer holding a human form - they roam the HABITAT as unnameable digital creatures.

The design of HABITAT creatures is based on the deconstruction of the body and its recombination with inorganic materials. In 1991, Myron Krueger suggested that In the ultimate artificial reality physical appearance will be completely composable. It is not simply about the modifying or the adjusting of existing anatomical features, but an extreme body modification or even perhaps a radical genetic intervention (Stelarc 2003: 03). Katherine Hayles (1996) believes that the body in the posthuman age is an integral part of an 'information/material circuit that includes human and nonhuman components, silicon chips as well as organic tissue, bits of information as well as bits of flesh and bone'. Identifiable human attributes such as facial features, skin and hair are absent in HABITAT creatures, leaving only muscles and bones entwined with liquid metal and ornaments, visually emphasizing their alienation from human identity.

Figure 3. Junya Duan (2023). HABITAT. [video installation with sound] Available at: https://2023.rca.ac.uk/students/junya-duan/.

The video format reproduces the discussion of identity and existence in the No Ghost Just a Shell project. By simulating a realistic uninhabited wetland environment, HABITAT has a vast, serene electronic landscape. The narration is in the voice of a virtual creature, with an existentialist monologue in AI-synthesized BBC radio voice, narrating its reflexive

consciousness, discussing its own origin and perspectives. As the camera moves along a predetermined path through the scene, the perspective is presented in the first person, creating a sense of plain observation.

futures are not a destination or something to be strived for but a medium to aid imaginative thought—to speculate with(Dunne & Raby, 2013). HABITAT makes radical assumptions based on the evolving trends of virtual identities, intending to offer a prefigurative criticism against an uncanny future. Through fiction, this project hopes to compel the audience to set aside common sense and doubts, to actively and boldly imagine uncharted and unrealistic realms, and then measure the present against this possible future as they return to reality..

5. Audience interview

Figure 4. Photo of HABITAT exhibited at Think-1 Gallery in Shanghai, taken in 2024.

HABITAT was first exhibited at the Royal College of Art in London in July 2023, and in March 2024 it participated in the online group exhibition at Spatial, and in December 2024. It was also included in a group exhibition at Think-1 Gallery in Shanghai in December 2024. During the two offline exhibitions, I connected with many visitors and conducted semi-structured interviews with some of them (n=9). The interviewees came from art, media and computer science industries, held a bachelor's or master's degree and were generally interested in media art. They had read the artwork description beforehand and were aware of the concept. During the interview, I asked about their interpretation of the artwork, changes in their self-perception and their watching experience. The interviewees provided enthusiastic discussions on personal identity, emotional response, and the visual effect of the work. The interview results revealed both favorable and unfavorable

factors concerning the conceptual expression of this work.

Seven interviewees said they could feel the uncertainty of personal identity during the watch. One mentioned that the empty landscape of HABITAT reinforced the sense of disorientation, as “an empty grassland makes me think of nomads”. 2 interviewees considered that the indistinct voiceover in the environment gave a sense of “hidden presence”. “The voiceover sounds like a voicemail message. I'm not really listening to what he's saying, but it's comforting to hear a human voice in such a desolate world.” However, some also proposed the idea of interacting with virtual creatures: “I hope to be able to have a conversation with it, rather than just listen to its speech as an audience.” “Watching the video is a bit like taking a sightseeing bus ride. Everything is pre-set, and I just follow the route. “ One interviewee said. The fixed pre-set camera path made him feel less present and more controlled in the virtual space.

During the creation, I have also sought feedback from media art educators. Academic reviews have pointed out that the highlight of this project is worldbuilding as a way to approach the issue, constructing new worlds on top of ideas. It places the audience in an environment that is different from reality, helping to break free from the shackles of imagination imposed by certain real-world conditions and allowing them to focus fully on self-reflection. The background sounds of wind and water add a sensory dimension, enriching the virtual environment and further isolating the audience from the exhibition space. The quiet and lonely atmosphere created by the white noise, the empty ground and sky, all echo the loss of self. Showing an ultra-futuristic world is a powerful response to current issues, forcing the audience to think critically about ethics and morality.

The results of audience interviews show that HABITAT effectively stimulates the audience to question and reflect. The experience of the virtual world made them aware of the instability of identity. However, some audiences also expressed the expectation of stronger interactivity to enhance subjective participation. In future creations, it may be worthwhile to enhance immersion and interactivity as a way to deepen the experience and enhance empathy..

6. Conclusion

With the development of technologies such as artificial intelligence, augmented reality, and deep fakes, the boundaries of digital identity are increasingly blurring. Digital identity is not only playing an increasingly important role in self-perception, it is also having physical implications. Reshaping the digital self is not only about self-expression, but also about privacy, ethics, and social issues. The challenges of identity perception are likely to become more severe in the future, and these challenges will persist over the long term as technology develops.

HABITAT places the issue of self-discrepancy in a virtual world, presenting an extreme variation of future identities. Combining relevant psychological and sociological research, HABITAT's core discussion revolves around digital self-presentation and self-discrepancy theory, and these concepts are visually represented through artistic methods. By creating a virtual world in which avatars have surpassed human form, the work guides the audience to reflect on the authenticity of digital identities while their development is unlimited, and reminds the audience to maintain a stable perception of self and attachment to the real world.

The primary goal of art as research and criticism is to flexibly adopt a variety of media to present vivid criticism and provide a new way of thinking (Thompson, 2012). Confronted with complex identity issues, HABITAT demonstrates how art practice can serve as a form of prior criticism, encouraging the audience to imagine and question the possibilities of future.

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Author 1 add an author bio that describes research interests and main achievements in a maximum of 40 words. [LEAVE BLANK UNTIL FINAL ACCEPTANCE] [_P/RoD Author Bio and Acknowledgements]

Chapter 6

DESIGN ENTREPRENEURSHIP

From Designers to Leaders : Cultivating Ethical Leadership by Design-Driven Entrepreneurship

Track leader: Joseph Press, PhD
Vice Dean & Professor at NACAA

ethical leadership
a new frontier for design
JUNE 3-7, 2025
Nantes, France
Cumulus Association
L'ÉCOLE DE DESIGN Nantes Atlantique

AMBITIOUS GOALS, GROUNDED CHALLENGES: DISCUSSING DESIGN AGENCY FOR THE STRATEGIC REDIRECTION OF BIG COMPANIES

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ABSTRACT | This article builds on the case of a French consortium launched in January 2023 by a consultancy specializing in decarbonization and adaptation to climate change, which gathers 10 multidisciplinary academic and 17 industrial partners. Based on the active involvement of corporate sponsors, it aims at developing a new set of tools to inform companies' strategy-making, in compliance with planetary boundaries.
This complex and multi-stakeholders project requires eliciting its epistemological and methodological foundations, to frame the involvement of each and every contributor. Our team of design researchers was embedded from the outset, but our role and the use of design tools has been evolving. In this reflective analysis, we propose to review the expectations, dynamics and outcomes of the programme so far and in the final phases to come. Our attempt is to assess to which extent the different means deployed effectively help companies overcome competition/cooperation dilemmas, and align with planetary boundaries. The study thus covers the four phases of the project: inspiration (driven by a participatory approach), scenarios (narratives supported by design fictions), quantified model and strategic appropriation. Our method combines insights from longitudinal participant observation and qualitative survey addressed to project holders from the consultancy. The analysis reveals some tensions running through the programme. First, awareness of planetary boundaries doesn't naturally lead to action. Second, the normative ambitions are somewhat offset by neutrality claimed in the process. Third, transition towards more ecosystemic business models is not a linear path for participant companies. Finally, we propose to discuss the agency of design in such complex project environments, according to the different expectations associated with the discipline.

KEYWORDS | PLANETARY BOUNDARIES, MULTI-STAKEHOLDERS PROJECT, FUTURE SCENARIOS, DESIGN FICTIONS, STRATEGIC REDIRECTION

1. Introduction

In the twentieth century, science has established the need to reframe human activities in a "safe and just space", between social foundation and ecological ceiling (Rockström & al., 2009; Raworth, 2017). This requires a radical shift to draw inspiration from living systems, which are autopoietic, interconnected, and rely on cooperation and symbiotic arrangements at all levels (Maturana & Varela, 1980; Capra & Luisi, 2014; Margulis & Sagan, 2002). Yet, most human organisations have been structured with a mechanistic view, in a global paradigm characterised by rationality, linear causality, the culture/nature divide, and the myth of progress (Chandler, 2018). The hiatus between the status quo and the pressing need for change leaves many companies in a state of disorientation or even "strategic vacuum" (Baumard, 2012). A tension is experienced between the broad context of societal change and the situated transition process in which they need to engage (Gaziulusoy & Erdoğan Öztekin, 2019). Despite evidence demonstrating the cost of inaction, many organisations remain trapped in the patterns of the prisoner's dilemma (Tucker, 1983), demonstrating cognitive dissonance between short term self-interests and the necessity to collaborate for achieving a remote positive outcome. Although this situation should foster actors' alignment, the bounded rationality of the human brain tends to favour competition, leading to "free-rider" behaviours (Hardin & Cullity, 2020) and even to the social phenomenon called "tragedy of the Commons" (Hardin, 1968).

Facing the urge of climate change and biodiversity loss, it is no longer time to wait for others to make the effort. To move away from the destructive patterns of the Anthropocene, human organizations need to leave aside short-term interests, embrace complexity, interconnectedness, and develop long-term and systemic perspectives. How to accompany this deeply challenging shift in mindsets and worldviews?

Since 2023, our design research team has been participating in a cross-disciplinary consortium aimed at providing new tools for decision and strategy-making in the Anthropocene era. At the heart of the programme, future scenarios are expected to stimulate corporate actors' ability to see further, wider and in more depth the determinants of change. But strategic redirection is a complex process that cannot be apprehended with determinism (Fry, 1999; Bonnet & al., 2021). Design tools and approaches are called upon to make fuzzy potential futures more tangible, and help (re)create meaning in uncertain situations. These ambitions come with challenges, which we propose to discuss in this reflective analysis based on two years of active involvement and participant observation, confronted with interviews. Our aim is to ponder the role of both the design discipline and a design research team in multi-disciplinary projects aiming at systemic change.

The article is structured as follows. First, the "map" (associated with the "territory" of our research) reviews literature about the challenges faced by big companies in integrating their activities within planetary boundaries. A focus is placed on future scenarios associating foresight and design. Next, the case studied is presented in more detail, with our research question and method. Analysis is then conducted from the angle of three

structuring tensions: between awareness and strategic appropriation of planetary boundaries; between value-neutral and normative perspectives; between global visions and grounded actions. Finally, a discussion on the agency of designers and the design discipline in such a complex project environment is proposed.

2. The "map". Reframing organisations' activities in a safe and just space

This state-of-the-art exposes the determinants of strategic change, before focusing on the roles of foresight and design to build future scenarios and support decision-making.

2.1. Planetary boundaries and strategy-making

A growing field of organisational studies focuses on how embracing paradox enables a dynamic learning process through which human groups increase their ability to anticipate, cope with and rebound from unexpected events. This builds on a set of capacities, starting with that of zooming in and out, exploring persisting contradictions from different viewpoints, integrating interdependencies and unavoidable tensions in any attempt to address a problem (Jarzabkowski & al., 2019). Scholars correlated those attitudes with organisational learning, opening to strategies that interweave planification and emergence (Smith & Lewis, 2011). Improvisation and tinkering are the cornerstones of such collective sensemaking processes (Weick, 1993), which can exceed corporate frontiers.

Different kinds of inter-organisational practices were identified in the literature: from the transfer and translation of insights, the framing of problems or/and solutions, until structural scaffolding. They culminate in the formation of coalitions, when urgent and complex issues require the representation and collaboration of diverse perspectives (Werle & Seidl, 2012). In those cases, the degree of strategic cooperation varies according to the closeness of relationships and the depth of interdependencies; just like the ways of coordinating, ranging from informal to contractual or normative (Astley & Fombrun, 1983). Individual leadership matters in the constitution of strategic coalitions: outside of any structure, cohesive, motivated, and action-oriented groups (even transitory) can develop agency, bring communities together and lead them to evolve (Manzini, 2017). Management studies identify catalysts and inhibitors for building alliances. Some are inherent to the organisations involved (resources and capabilities), some are environmental (external pressure), while others lie in the relationship itself: governance, coordination, trust and fit between partners, and power dynamics (Dzhengiz, 2020). At all scales, fluidity in the decision-making chain is also required for emergent strategizing (Mintzberg, 1990; Morin, 1990).

Eventually, the outcomes of inter-organisational collaborations are to be found both at company- (capabilities, value frames, performance) and system-level (learning, contributions to society). This is in line with the ambitions of the project studied in this article, which aims at integrating ecosystemic levels in business models. We assume that this first and foremost requires transforming the way corporate actors see their role in the future.

2.2. Future scenarios, when foresight meets design

By definition, the future can only be apprehended through projection (and imagination to ensure it is not limited to extrapolating the present). Foresight, design and fiction all participate in a collective capacity to envisage alternative realities and potentialities. This is not self-evident, and requires enabling situations, with supporting mechanisms and artifacts. Future scenarios are one of them, providing decision-makers with occasions to evaluate strategic options and ascertain the possible consequences of action. More than preparing for predictable situations, this is expected to help engage turbulence (Ramirez & Selsky, 2016) and spark discussion on the conditions under which contrasted potential futures might occur. In this line, future scenarios are a means to stimulate strategic conversation, by putting to the test the valuation mechanisms of a group. Besides making normative assumptions explicit, they also provide grounds for challenging the instrumental reasoning embedded in many organisational models (van der Heijden, 2008).

As this is both conceptually and emotionally challenging, descriptive scenarios are to be given a transitional and immersive character (Ramirez & van der Heijden, 2007). This is where the design discipline has a role to play. Starting with "what-if" questions, designers stage cathartic experiences to embody, reveal and discuss the levers and obstacles to change. This can be achieved through experience prototyping (Buchenau & Fulton Suri, 2000), and supported by diegetic objects. Those are considered "world-building artifacts" (Sterling, 2013), which connect their audience to the speculative realities of the system being envisioned through narration and active engagement.

The recent convergence of design research and future studies (Poli, 2019) falls within the scope of "prospective theorising" (Laszlo, 2021). Opposed to positivist empiricism, this epistemological standpoint calls for imaginative and action-orienting research approaches that consciously work to help bring possibilities into existence. The range of what is called "data" expands to narratives, images, metaphors, analogies or "real utopias"... and their analysis can involve speculations or thought experiments, forms acknowledged to be virtually absent in management theorising, despite their scientific legitimacy (Aguinis & al., 2023). This calls for action researchers to adopt a reflexive approach, continuously examining their assumptions as well as the ethical and moral implications of their work. It is also political: power structures, social inequalities, and ideological biases are to be analysed in order to make space for the acknowledgement and expression of different values – including disagreements or tensions (Gümüsay & Reinecke, 2024).

Building on these recommendations, our design research team aims to contribute constituting and animating a shared reflective platform with the stakeholders of the project presented in more details below. The tensions associated with this ambition will be discussed next.

3. The "territory". Case studied, research question and method

3.1. Project configuration and research question

In January 2023, a French consortium gathering 10 multidisciplinary academic and 17 industrial partners was launched, carried by a consultancy specialising in decarbonisation and adaptation to climate change. A four-year programme has been

set up, aiming at creating strategic tools to help decision-makers bridge vision and action, by developing their ability to diagnose complex situations, identify weak signals, and build conditions for coordinated initiatives. One of the goals pursued is thus to foster the constitution of coalitions between participant companies sharing matters of concern. Corporate decision-makers are actively involved, to help overcome the cost of inaction.

At the core of the project is a quantified model connecting human practices with Earth systems, designed to crystallise the transformation of value chains and future conflicts over the use of resources. While this tool is mainly informed by sustainability sciences and strategic foresight, inputs from human and social sciences and design were key to ensure consistency and credibility. In this line, the program started with the co-creation of four qualitative future scenarios, associating technological developments, societal orientations and biophysical constraints. At that time, our design research team was called on to contribute grounding scenarios in human practices, making use cases tangible, and orchestrating the participation of corporate actors. More broadly, our role as contributors and academic advisors has been adaptable, evolving with the different phases of the project through continuous dialogue with partners from the consultancy.

This figure summarises the progress of the project between 2023 and 2026:

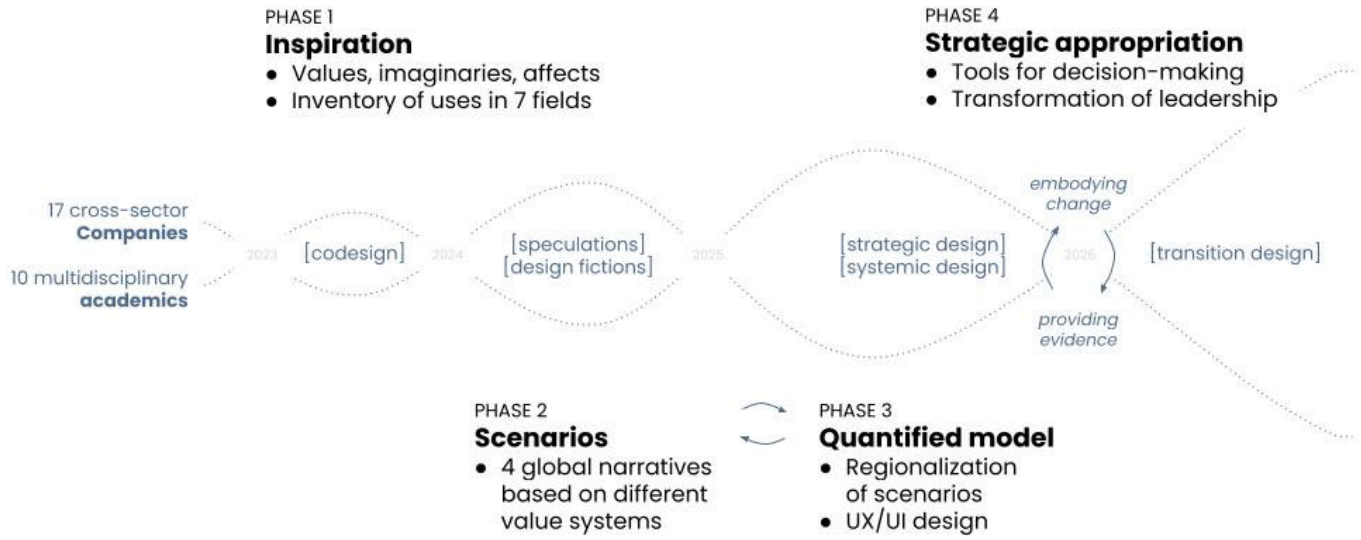

Figure 1. A four-year multi-disciplinary and multi-stakeholders project divided into distinct phases.

- Phase 1. was dedicated to understanding the determinants of human practices and lifestyles: values, worldviews, imaginaries, aspirations.
- Phase 2. integrated these building blocks into four qualitative scenarios, associated with different climate trajectories. In these initial phases, the perspective of design was a natural fit.
- Phase 3. translates scenarios in terms of resources and energy consumption, and pressure on ecosystems. Quantification is carried out on the scale of 11 regions of the world (geopolitical perspective). At this stage, design is mainly used to highlight tensions and illustrate some situations from the scenarios. There is an iterative loop between phase 2. and 3., to ensure narratives respect biophysical projections.
- Upcoming phase 4. will focus on the appropriation of scenarios by companies. During this key period, strategic design methods and tools will be used to engage participants in forward thinking exercises that are both experiential and conducive to strategic conversations.

Throughout the entire programme, our main concern has been for the integration of heterogeneous scales and layers. In a previous article, we identified four ways in which design approaches and tools can contribute to this end (Berger & al., 2024):

- Include multiple, non-hegemonic viewpoints (see Escobar, 2008)
- Connect scales: macro (Earth system), meso (human organisations) and micro (life experiences – see Coops & al., 2022)
- Stimulate discussion on the sustainability and desirability of possible futures, without evacuating dissensus (see Candy, 2010; Boehnert & al., 2018)
- Support transition or redirection paths (see Fry, 1999; Bonnet & al., 2021).

Late 2024, noticing a gap between participants' increased awareness and limits to effective change prompted us to reinvestigate our roles, approaches and postures. In this paper, we focus on the initiatives already taken, with a twofold reflective lens on the place of our external design research team, and that of the design discipline within a complex project environment. Our purpose is to assess to what extent the different means deployed so far effectively help participant companies navigate tensions and dilemmas. We also aim to inform the remaining stages of the programme, and more broadly, to engage in a topical discussion about the agency of design to support the transformation of human organizations towards more sustainable operating models.

3.2. Research protocol

This reflective analysis firstly builds on one and a half years of participant observation (2023-2024), documented through our logbooks. Those report on the briefings, ideas, discussions, and decisions made throughout the project - as well as the questions remaining. They reflect the outlooks of the different stakeholders in the project, from our three unique viewpoints. Together in January 2025, we revisited our field notes and put our experiences into perspective with some hindsight.
This self-analytical dimension is complemented with the results of a qualitative survey addressed to three main project holders from the consultancy, in June 2024. By bringing those materials together, we hope to acknowledge the heterogeneous understandings, as well as the evolutions of a complex programme that is still on-going and evolving. Scientific rigour is expressed through reflexivity and transparency about normative assumption, who participated, and whose voices are considered.

We should hence accept some limitations to this study, that are less due to our involvement as action researchers than to the situation investigated, which involves dynamic ecosystemic relationships. In this line and in a pragmatist vein, our concern is less for generalisation, transferable good practices or methods than for generative potency (Gergen, 1978) and affordances for other contexts (Ansari & al., 2010). We thus hope that the insights of this research contribute to nurturing adaptable ways of thinking, able to transcend reductionism and/or disciplinary silos.

Our analysis is structured around three tensions that we identified as pivotal in the programme: between awareness and strategic appropriation of planetary boundaries; between value-neutral and normative perspectives; between global visions and grounded actions.

4. Analysis of three pivotal tensions

4.1. Awareness / strategic appropriation of planetary boundaries

Bringing together a consortium is expected to help overcome siloed and individualised perspectives for more communal ones, which is a prerequisite to address wicked problems and build resilience in uncertain conditions (Weick, 1993). In this line, the programme is a shared learning journey, a system of its own to design, co-design and re-design. All project holders consider it of prime importance to "*develop processes to question and document the needs or expectations of the various communities that make up our 'clients'*". This is in line with an iterative design perspective, focused on adapting its accompaniment posture according to the evolutions of the situation. For us external design researchers, the consortium is not a field for deploying methods, but a space for conversation and co-construction. Ensuring the active involvement of corporate participants is thus key, but also more importantly supporting their ability to act (to influence the political dimension) and their inner transition (to influence the cultural dimension). This is the aim of our action research approach, but its progression may be questioned as we enter the most strategic phase of the programme [Phase 4 - Figure 1].

According to the project managers, the outcomes produced so far (inspirational material, scenarios, design fictions, quantified model) all effectively raised participants' awareness. The most appreciated contribution seems to be the clarification of potential competition for resources, as this is already an identified strategic issue for corporate actors. Sector-specific indicators and key figures also provide valuable insights: "*Quantification creates credibility and trust: if there are numbers, it's serious, solid. For us, it's a Trojan horse*" assumes a project holder. Yet, a point of vigilance must be placed on the understanding of the forward-looking exercise: several partners tend to perceive it as projection, expecting intermediate milestones to inform a linear trajectory. This is a challenge for the upcoming phase focused on strategic decision-making. Early spring 2025, a workshop is dedicated to reinvestigating companies' business models in light of some building blocks of the scenarios. Transversal support is provided by an ongoing PhD thesis on strategic leadership and the design of coalitions, and a research chair in strategy for the Anthropocene launched by a partner business school.

Our observation so far is that participants feel that space exists to strategize together in novel ways, they do not know where to stand yet. The confrontation to potential disruptions mostly triggers problem-solving approaches and local adaptations. Shifting from a competitive to a cooperative paradigm indeed represents a quantum leap, that the programme has not reached to date. Only the first step towards collective sensemaking is tangible through experience and knowledge sharing among participants, as well as ecosystem building. From our point of view, sharing an explicit theory of change could help promote more communal perspectives to business and strategy making. But this ambition is limited by the desire of the consultancy leading the programme to maintain some distance regarding the decisions made by companies. This leads to another tension, relating to the normative and/or prescriptive ambitions of the project.

4.2. Value-neutral / normative perspectives

In line with critical theory, proponents of prospective theorising call for action researchers to acknowledge that all theory building is inherently based on certain normative

assumptions, even when aimed at value-neutrality (Gümüsay & Reinecke, 2024). In our case, the project assumes a non-prescriptive approach, firstly because it is positioned upstream from the strategic decisions that will be made (or not) by participant companies. But this strategic phase can't ignore social and geopolitical issues. Cautious about tackling these issues, the consultancy assumes a non-political stance. "*We are trying to evaluate the size of the cake to be shared, but it's not our role to decide on the rules of sharing*" illustrates the main project holder. And yet, underlying ideologies must be revealed if we are to discuss them and hope to challenge the dominant paradigms. Otherwise, the extractive and competitive status quo will keep on reproducing itself.

How far does our programme go in setting standards, and how does our design research team participate in arbitration? In 2023, the first phase assumed a value-led perspective. In the workshops devoted to inventorying current and projected human use patterns, we provided inspirational material staging paradoxical tensions, to reveal how values, imaginaries and affects deeply shape human behaviours (see Berger & al., 2024). More importantly, it is from different value systems that the future scenarios were built. In this divergent phase, participants appreciated being immersed in contrasted potential worlds, with an analytical and critical eye. According to the project holders, the analogies and materialisations we provided allowed corporate partners to "*take a different or broader look at the theme they were asked to work on collectively*" and "*reveal links or dimensions they hadn't previously identified*". Preserving this granularity and navigating between the macro and the micro becomes more complicated at the quantification phase [Phase 3 - Figure 1]. This perspective reflects a form of abstraction, in which the multiplicity of viewpoints is difficult to express. Project holders consider final users or citizens "*as archetypes, which don't correspond to anyone in particular*". Obviously, building a model requires an increase of generalization, and thus a simplification of complexity. But local specificities are likely to be lost in this movement above the field. How to maintain a close look to the actors and situations addressed (Hennion & Monnin, 2021)? This echoes the recurring challenge to see and analyse patterns from different angles and scales.

At this stage, deeper interdisciplinary work is required to diffract the narratives with a finer grain than that of geopolitical regions, to make them "land on Earth" and become terrestrial (Latour, 2018). This entails integrating multipolarities, interdependencies, and the messiness of any societal dynamics; as well as opening beyond the homogeneity of perspectives represented by the companies of the consortium – which all represent past, present, or aspiring leaders. Plural voices must be included, with nuances and contradictions responding to temptations for generalisation. In the upcoming strategic phase, there is thus a need to discuss what a "sustainable horizon" means for participants, and what responsibility companies are ready to take on. This can be mediated by design fictions able to prompt debate (hypothetical organisational models, maps, laws or regulations…).

4.3. Global visions / grounded actions

This last tension also relates to the somewhat normative but not prescriptive ambition of the programme, and to the situation of multinational companies which mostly function in a deterritorialized manner. By this we mean not so much their scale and distance from final users/consumers/citizens, as their relationship with the biophysical realities of their operating spaces. Rethink business models in compliance with planetary boundaries requires anchoring and identifying commons around which to organise (Ostrom & al., 1999). This is even more the case when aiming at inter-organisational cooperation.

Our project holders assumed that this goal would naturally be reached by bringing together a learning community engaged in sensemaking: shared knowledge and reflection were expected to drive alignment and progress. Yet, halfway through the programme, a hiatus remains between the efforts made to reach a shared understanding of the situation, and its transformation into concrete actions. To date, corporate partners have been mostly interested in gathering arguments to bring back in their companies. They tend to consider the consortium as an inspirational space rather than one for action. Besides the psychological dimension, this may point to the limits of individual decision-making in big companies.

A working hypothesis to develop collective agency lies in fostering a commons-based approach within and among companies. Indeed, coalitions are defined by shared matters of concerns, around which they organise themselves (Werle & Seidl, 2012). Consequently, to effectively support collective strategy and decision-making, the tools developed in the programme will need to stand against competitive frameworks, such as classical business model canvas. Inspiration can be found in networks of actors engaged in different sorts of coalitions and/or commoning, which function in ecosystems and limit the place of economy within a broader ecological view. Such alternatives might inspire corporate partners new understandings of their roles and responsibilities, until integrating novel stakeholders, patterns and forms of value creation. This will be tested in the upcoming strategic workshops and further developed in the doctoral project associated with the programme.

More than ever, we have become aware of the complexity of articulating different perspectives, and of the time needed for systemic change. Transition is not a process to be decided and managed, but a time of "emotional wilderness" (Bridges, 2004). Space needs to be held for loss, conflict, and backlash, while working through power dynamics (Miller, 2024). Even though our posture of external contributors and advisors is delicate, we consider it an asset to accompany transformative journeys with a design-based approach informed by human and social sciences. We propose to discuss this situation in the following final section.

5. Discussing the agency of design in complex project environments

From the outset, the consultancy leading the programme assumed an iterative and learning process: "*We're on a test & learn basis, continuously gathering feedback on partners' needs (in informal interviews, presentations and workshops), which also change over time and in response to our results. […] As the project is a lengthy one, the phase of gathering these needs is also long and somewhat fuzzy.*" This view expands between action research partners, with our team expected to contribute shaping orientations in a systemic manner. In this respect, our contribution is first and foremost to the project team, and only then to the companies in the consortium. We have a sort of mirror role, to identify and map the playing field, set expectations for the programme and offer means to meet them. Being an outsider naturally enables to see alternatives and multiple perspectives. Here, our frontier position allows and forces hindsight, while participating in transformative action enables ongoing evaluation.

This whole context requires constant adaptation and close communication. A monthly monitoring committee is set up with the consultancy, to review progress, coordinate

action and prepare upcoming milestones. Besides, specific initiatives are discussed along the way, with the concerned stakeholders. Since 2023, the project team has expanded, to meet the consultancy's need for more internal design resources. This prompted re-examination of the expectations associated with "design", "designers" and "design researchers" in the project. On the one hand, they concern the creation and production of outcomes (ranging from participatory workshop materials to data-based model). On the other hand, they represent a disciplinary perspective on the transformative path undertaken by participants. Those two representations imply timeframes, scales and scopes of intervention which can significantly vary. They also entail different relationships with academic partners; for instance, while we all agree on the need for a systemic perspective, there are different scientific standpoints about what this means.

Evolving in such a complex setting, with heterogeneous yet overlapping perspectives, remains a real challenge. In our experience, what has been helping is the time taken to dialogue and better understand each person's skills and aptitudes, in a trusting environment. Time is indeed a key component of designing for systems-level change. Complex and wicked problems are not "solvable" with fast-paced processes whose objectives are clearly predictable. Periods of action and intervention are to be counterbalanced by intervals of observation and reflection "in order to understand how the system is responding" (Irwin, 2018). But this slow approach contrasts both with the current business paradigm and the urgency of change, challenging our concern for transformative impact. This project therefore teaches us patience and methodological inventiveness, demonstrating that inner transition starts with ourselves!

6. Conclusion

In this paper, we attempted to draw a picture of a multi-disciplinary project in which design is embedded both as a set of tools and methods, and as a disciplinary perspective. Obviously, we believe in a holistic approach to navigate the tensions, power dynamics and emotional shifts that are inherent to any transformation. But there is no prewritten protocol to follow, and it is not yet possible to predict the actual impacts of the programme. As we write in 2025, the main concern is for addressing the critical gap between shared understanding and collective action. We hope to succeed in providing tools with a reflective and strategic potential; in fostering corporate actors' motivation to experiment alternative models; and in equipping them with practical means to leave aside the dominant competitive logics for the cooperation that is needed to reintegrate human activities in a safe and just space.

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Beyond Aesthetics: Defining Ethical Accountability in Design

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ABSTRACT | The evolving role of designers—from product creators to system thinkers—has expanded their influence (Buchanan, 1992). However, ethical considerations are still primarily a personal choice rather than a requirement across the industry. As design now shapes complex social and technological systems, designers must act responsibly and equitably (Costanza-Chock, 2020). Yet, the broadening of design's role often outpaces the development of ethical frameworks guiding designers' work (International Council of Design, n.d.).

Today's designers increasingly work as interdisciplinary generalists, uniquely positioned to question and navigate intricate systems. They bring a "philosophical" lens, uncovering deep-seated values within industries and addressing societal impacts (Nussbaum, 2013). As designers take on leadership roles in fields like healthcare and AI, where the ethical stakes are high, the failure to prioritize conversations about values and ethical decision-making can create significant challenges, especially when designing solutions with far-reaching consequences (Technology Review, 2023).

This workshop aims to critically engage participants in a conversation redefining ethical accountability, focusing on how personal values influence professional decisions. Rather than prescribing a definitive code, we emphasize the power of dialogue and reflection to uncover hidden biases and assumptions that shape actions (Costanza-Chock, 2020). Participants will explore critical questions about design's influence: How do personal values align with professional responsibilities? What unconscious biases affect ethical decision-making? How can designers consciously bridge gaps between their aspirational values and their real-world actions?

Keywords: Ethical Design, Leadership Accountability, Value-Driven Decision Making

1. Introduction

In the dynamic world of design leadership, we often operate under the belief that our decisions are guided by our core values. But what if the values we think we uphold differ from the ones that actually shape our actions? Understanding our values is only the first step in ethical leadership; the real challenge lies in recognizing how hidden pressures and competing priorities can quietly shift our actions away from our core principles (Kegan & Lahey, 2009).

This immersive workshop is designed to uncover the hidden layers of participants' decision-making process, offering profound insights into the alignment—or misalignment—between their aspirational values and real-world behaviors. Through thought-provoking exercises and reflective discussions, participants will explore key questions such as:

- How do the values I believe I hold compare to the values that drive my decisions?
- What unconscious biases or assumptions might be influencing my leadership choices?
- In what ways can I align my actions more authentically with my core values?

2. Facilitating Reflection with Design-Led Research

To facilitate this exploration, the authors will introduce a design-led research tool specifically developed to help leaders reflect on and discuss the explicit and implicit values that shape their design decisions. Inspired by Robert Kegan and Lisa Lahey's Immunity to Change framework, this workshop helps uncover competing priorities that may prevent individuals from acting in alignment with their aspirational/implicit core values (Kegan & Lahey, 2009).

By exploring and reflecting on their values, participants will have the opportunity to step back, gain insight, and develop a clearer understanding of how their values might influence decision-making in leadership roles. This tool serves as a catalyst for reflection, encouraging discussions on value-driven decision-making and accountability in leadership (Nussbaum, 2013).

3. Anticipated Learnings

By engaging with real-world scenarios of ethical design challenges, participants will gain deeper insights into the subconscious factors shaping their decisions, allowing them to bridge the gap between aspiration and action.

- **Self-Realization:** Participants will gain a clearer understanding of the values they believe they hold versus how those values are reflected in their actions.
- **Insight into Competing Priorities:** By contrasting aspirational values with real-world decision-making patterns, individuals will uncover hidden biases and competing priorities that influence their leadership style.

The transformative realization in this workshop comes when participants recognize that the values they declare may not always guide their behavior, especially in high-pressure or instinctive situations. This disconnect can be both surprising and enlightening, offering a powerful opportunity for reflection and growth.

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Beyond Craftsmanship: Leadership in the Design and Entrepreneurship of Material-Based Craft.

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ABSTRACT | Recently, craft has experienced a resurgence reflecting alternative approaches to work, organization, and community in society (E. Bell et al., 2018). Artisans and designers working in the craft sector are increasingly tasked not only with mastering the knowledge and craftsmanship to produce artifacts but also with innovating business models that convert skills and products into brands with new services and experiences (Fjeldstad & Snow, 2018). This transition demands a role shift from hands-on craftsmanship to entrepreneurship, where designers incorporate economic, cultural, and ethical responsibility into their work (Huang & Anderson, 2019). In this context, the artisans' and designers' leadership emerges to foster productive, authentic, and responsible relationships within communities. However, acquiring entrepreneurship skills for artisans might be challenging, ranging from marketing strategy to trust-building with stakeholders (Ivanycheva et al., 2024). We are intrigued by the challenges they face in the craft sector during their transition to entrepreneurs and the leadership that develops in this process.

Therefore, this paper concentrates on practitioners in different kinds of material-based crafts – ceramic, enamel, glass, fabric and jewellery. We view material-based crafts as planetary forms of craftsmanship shared with common knowledge and rooted in the local communities. They also present different manifestations from traditional to industrialized craft, as well as pure, technical, and creative craft in intercultural history (Kroezen et al., 2021). Based on preliminary research, the various roles makers, craftspeople, artisans and designers play in the craft sector are investigated, across different business models --

from non-employer to employer types. We view leadership as an interactive process of influence that happens to achieve common goals within contexts (Silva, 2016). Through in-depth interviews with artisan entrepreneurs making business in China, we investigate the stakeholder relationships, including customers, suppliers, collaborators and peers. Besides, the antecedents, leadership behaviours, and outcomes are also examined. Drawing from an inductive analysis, this research identifies the ethical and responsible leadership developing as artisans'/designers' transition into entrepreneurs, and summarize the qualities and skills essential for craft entrepreneurs. It provides a new perspective on the role of leadership in the craft sector, with implications for fostering entrepreneurship in design education and practice.

KEYWORDS | Artisan Entrepreneurship, Craft Entrepreneurship, Entrepreneurial Leadership, Ethical Leadership, Design and Entrepreneurship

1. Introduction

The craft sector, as a creative and diverse part of the global economy, has gained significant attention over the past decade due to its unique contributions to both cultural heritage and national economic growth (Ratten, 2017). Craft, defined as an activity involving skill in making things by hand, is seen as an alternative approach by contemporary artisans and designers to authentic and autonomous work (Smagina & Ludviga, 2021). Artisans now extend beyond traditional craftsmanship, engaging in craft businesses and lifestyle entrepreneurship across industries like manufacturing, services, and tourism (Ivanycheva et al., 2024). These artisans create functional, artistic handcrafted goods while pursuing entrepreneurship that aligns with their values and demonstrates responsible leadership.

This transformation demands a critical role shift from hands-on craftsmanship to entrepreneurship, where artisans/designers must take economic, cultural, and ethical issues into their consideration (Huang & Anderson, 2019). Artisan entrepreneurship, while a subset of the broader entrepreneurial landscape, demands balance of self-expression and commercial sustainability. Unlike conventional businesses focused on profit and growth, artisan entrepreneurs prioritize authenticity, personal values, and long-term trust with customers and communities (Dana et al., 2022). Despite the growing academic interest in the field of artisan entrepreneurship, there remains a significant gap in understanding the artisans as leaders who have an interactive process of influence that happens to achieve common goals in their communities (Mousa et al., 2024). While much of the research on leadership has focused on large corporations, the specific nuances of entrepreneurial leadership within small, artisanal businesses have yet to be fully explored (Sousa et al., 2021). This paper aims to address this gap by investigating the intersection of leadership and entrepreneurship in the craft sector, particularly focusing on the ethical, responsible, and virtue-driven leadership models employed by artisans. By examining how these entrepreneurs sustain their business, and take social responsibilities, this study seeks to contribute to the broader understanding of leadership in creative industries, with particular emphasis on the craft sector.

Through a quantitative approach with an inductive methodology, this study explores the lived experiences of artisan entrepreneurs in China. By interviewing artisans/designers across diverse material-based craft practices, the research offers valuable insights into how leadership manifests in non-employer and small-scale, craft-based enterprises. It provides a deeper understanding of the entrepreneurial processes that drive these businesses, as well as the ethical and responsible principles that underpin their operations and impact on communities.

2. Business and Entrepreneurship in Craft Sector

2.1. Craft Businesses

Craft businesses form a vital component of today's cultural and tourism market, playing a significant role in both regional and global economic competitiveness (Kapp, 2017). Craftspeople or artisans engage in different types of work across manufacturing, service, and tourism industries .(Ivanycheva et al., 2024) Those who work with materials often engage in the design and production of handicrafts, drawing on creativity to achieve aesthetic excellence. Their craft spans various domains, including textiles, leatherwork, ceramics, glassware, and jewellery. Many artisans working with materials operate as self-employed professionals, allowing them flexibility in setting their work schedules (Valdimarsdóttir, 2024). Depending on their circumstances, Luckman (2015) categorized artisan businesses into seven distinct types, illustrating the diversity of the craft economy based on individuals' engagement levels and business structures. These categories include hobbyists, part-time makers, part-time small business makers, full-time small business makers, part-time design/studio/art/craft makers, professional full-time design/studio/art/craft makers, and named artists (Luckman, 2015). Some of the categories engage in entrepreneurship for diverse reasons, often driven by a serious pull and push factors (Hughes, 2006).

2.2. Artisan Entrepreneurship

Entrepreneurship has been broadly defined as the process through which individuals or groups initiate economic, social, institutional, and cultural change (Rindova et al., 2009). It involves intentional efforts by individuals to leverage their skills in addressing market gaps. Traditionally, economic theories have emphasized the role of entrepreneurs as heroic figures, characterized as innovators and pioneers who exploit market inefficiencies (Harrison et al., 2023; Hoyte, 2018). However, this perspective does not fully capture the realities of small- or medium-sized enterprises in the craft sector.

In the context of craft/artisan entrepreneurship, entrepreneurs primarily focus on creating handmade products, often avoiding automated production techniques (Shane & Venkataraman, 2000). Artisan entrepreneurship is typically defined as the process of establishing and managing a business that relies on human skill and craftsmanship to produce functional goods or services with inherent aesthetic value (Mulholland et al., 2022). It's also categorized under lifestyle entrepreneurship, prioritizing self-expression, and personal fulfillment over rapid business expansion (Ivanycheva et al., 2024).

There has been a growing academic interest in artisan entrepreneurship (Hasanah et al., 2023). Prior studies have explored various aspects of artisan entrepreneurs, including personality traits (Hoyte, 2018), skills(Rashid & Ratten, 2021), and classification (Smagina &

Ludviga, 2023). Unlike conventional entrepreneurs, craft entrepreneurs are often driven by motivations that extend beyond profit maximization and business expansion. Their entrepreneurship is shaped by personal values and individual beliefs (Smagina & Ludviga, 2020). However, despite the increasing academic focus on artisan entrepreneurship, limited research has been conducted on the leadership dynamics within artisan enterprises and how leadership intersects with entrepreneurship in the craft sector.

3. Leadership in Craft Sector

3.1. Artisans Act as Leaders

Leadership, though widely debated, is broadly seen as a dynamic influence process where individuals recognize and accept a leader to achieve shared goals (Silva, 2016). Existing literature highlights that artisans/designers strategically leverage user-centered design methodologies to identify new business opportunities, leading to the creation of innovative products, services, and experiences (Huang & Anderson, 2019). Additionally, research underscores the critical role of in-person interactions and the cultivation of trust-based relationships with customers in small businesses, particularly artisan enterprises (Ratten, 2017). This aligns with the broader concept of moral leadership. Research has identified how artisans act as responsible leaders with autonomy, competence, and relatedness and are motivated by cultural and sustainable factors (Mousa et al., 2024) and the role of ethical market practices in the regional do-it-yourself craft sector (Curtis, 2016).

3.2. Entrepreneurial Leadership

Entrepreneurs are often associated with leadership qualities, given their role in guiding ventures toward success (Pauceanu et al., 2021). Some scholars view entrepreneurship and leadership as distinct concepts, exploring their intersections to identify overlapping characteristics. Fernald et al. (2005) introduce vision, problem-solving, decision-making, risk-taking, and strategic initiates. However, these traits primarily focus on individual capabilities rather than the mutual relationship between leaders and their followers. Instead, Pauceanu et al. (2021) define entrepreneurial leadership as a fusion of leadership and entrepreneurship, not just entrepreneurship alone. Recent studies on entrepreneurial leadership emphasize its contextual nature, offering a more comprehensive perspective without settling on a singular definition (Harrison et al., 2023). Rather than focusing solely on personal traits and business acumen, entrepreneurial leaders also demonstrate a keen awareness of their environment (Pauceanu et al., 2021). They recognize and capitalize on emerging opportunities, adding value not only to their enterprises but also to stakeholders and the broader community.

In the craft sector, entrepreneurial leadership emerges naturally from the interplay between artisans' creativity, their collaboration with stakeholders in supply chain, and the direct engagement with customers. While entrepreneurial leadership in craft sector includes traits such as vision, risk-taking, and strategic decision-making (Fernald et al., 2005; Pauceanu et al., 2021), the craft context reveals deeper relational and community-oriented dimensions. Artisans take on leadership roles that involve more than simply offering products for sale and business management; they collaborate with, influence, and inspire customers, community members and other stakeholders (Curtis, 2016).

3.3. Moral Leadership

Ethical and moral leadership has gained focus following recent corporate scandals (Banks et al., 2021). This shift has fueled academic interest in leadership models that prioritize virtues. Among these, servant, ethical, and authentic leadership have been recognized as key frameworks for fostering morally driven decision-making (Hoch et al., 2018). Such leaders prioritize fairness, transparency, and balanced decisions, aiming to create social, ecological, and economic value through ethical and compassionate actions (Hussain, 2013). Despite the increasing recognition of moral and ethical leadership in organizational studies, research in this area has predominantly focused on large corporations and formal institutions. The ethical leadership practices of lifestyle entrepreneurs and small, non-employer businesses remain relatively underexplored (Mousa et al., 2024).

Artisans' leadership drive extends beyond economic growth to include sustaining traditional techniques, protecting regional identities, and practicing ethical sourcing of materials (Curtis, 2016). These approaches broaden the conventional definitions of entrepreneurial leadership. They lead to co-created initiatives and new business models that meet both personal financial needs and community benefits. Further research is called to explore how ethical leadership shapes smaller enterprises and supports sustainable, responsible business practices (Ratten, 2017; Valdimarsdóttir, 2024).

4. Method

This study adopts a qualitative research method with an inductive approach, which enables us to explore the participants' contextualised entrepreneurial experiences in China. The inductive approach allows for the development of insights directly from the data, making it particularly suited for investigating areas with limited prior research and attention (Creswell & Poth, 2016).

We used snowball and purposive sampling to recruit participants for semi-structured interviews (Mousa et al., 2024), with the key criterion being the ability to sustain a livelihood through their craft, focusing on leadership in artisan entrepreneurship. Preference was given to artisans with a certain level of reputation, recognition, and active engagement in their communities. The study includes seven full-time professional artisan entrepreneurs who work independently or in teams. Participants specialize in ceramics, glass, enamel, fabric, and jewellery, representing a diverse range of material-based craft practices. They were drawn from various regions across China, including Beijing, Shanghai, Jiangxi, and Yunnan, working in different settings such as domestic benches, studios, or shared spaces.

Participants were contacted individually, with interviews conducted online or in-person for accessibility. Following ethical guidelines, they were informed of the study's objectives before their participation. The interviews first established participants' backgrounds, career trajectories, business models and stakeholder networks. Subsequent questions examined their entrepreneurial motivations, visions, risk perceptions, problem-solving strategies and decision-making processes. Finally, participants were asked to share their perspectives and actions concerning moral and responsible leadership within their fields (Lawton & Páez, 2015).

The qualitative data was analyzed inductively using a thematic approach with Atlas.ti software. Initial and focused coding were conducted to identify key themes that emerged from the interviews. The findings derived from this analysis are presented in the subsequent section.

5. Findings

5.1. Navigating Artisan Entrepreneurship

The research confirm that artisans are motivated by pull factors, like authenticity and meaningful work, and push factors, such as health issues, unemployment, or family responsibilities (V. Bell, 2022). Authenticity is a fundamental characteristic of artisan leadership, shaping both the creation process and customer relationships. In the early years of their careers, artisans primarily focus on balancing economic sustainability—ensuring their craft can provide a stable livelihood—and artistic expression, which helps them establish a distinctive identity in the market. They prioritize designing and producing works that are not easily discarded, aspiring for their creations to hold long-term significance for users. Even amid market pressures, artisans remain committed to their craftsmanship principles and personal values.

As highlighted by Mousa et al. (2024), autonomy is another key motive in craft entrepreneurship, as artisans highly value the ability to work on projects that offer a sense of independence and self-fulfillment. Artisans exercise autonomy in selecting their clients, choosing to collaborate only when a project aligns with their artistic and ethical principles. If a request conflicts with their creative philosophy, artisans may decline it or guide customers toward appreciating their values, reinforcing that craft is an intentional, value-driven practice rather than merely reactive to market demands.

Artisan entrepreneurs strategically integrate storytelling, user-centered services, and experiential offerings to differentiate their businesses. Storytelling is a key marketing strategy, allowing artisans to share their design philosophy, values, and craftsmanship through social media and consumer engagement. To sustain their businesses, artisan entrepreneurs use a multi-channel approach, including store agencies, exhibitions for exposure, craft fairs, and creative markets for direct customer engagement. In addition, artisans specializing in custom orders emphasize user-centered services and co-creation, where they engage in extensive consultations—often lasting weeks—to translate customer needs into unique design elements. Some artisans see their work as experience-oriented service rather than a mere product transaction, guiding and collaborating with clients, sometimes involving them in production for a more personal experience. Beyond selling goods, they offer workshops and curriculums, turning expertise into services and diversifying income. This shift from product-based transactions to and experience-driven interactions reflects how artisan entrepreneurship extends beyond craft production into dynamic, relationship-driven, and service-oriented business models.

5.2. Collaborative Leadership and Stakeholder Networks

Unlike traditional hierarchical business structures, leadership in craft enterprises exists beyond employer-employee dynamics. Artisans in craft-based enterprises tend to cultivate partnerships built on shared values and mutual trust. Leadership within these businesses is generally informal and dynamic, favoring collaboration over rigid managerial control. This kind of leadership can be attributed to the competence to develop their own business and at the same time, a broader sense of relatedness to their community.

Throughout the process of starting and expanding their ventures, artisan entrepreneurs continuously engage in vision-setting, problem-solving, decision-making, and risk-taking.

Collaboration emerges organically as they pursue the development of their business trajectories. Collaboration in craft entrepreneurship varies based on factors such as craft type and geographic location. For instance, in ceramic production, artisans engage with multiple partners owning different infrastructure and skills during manufacturing, including raw material suppliers, clay workshop, mold makers and kiln operators. Flexible labor arrangements are a common feature of craft-based businesses, particularly among small-scale entrepreneurs. Artisans manage fluctuating demand by hiring skilled workers as needed, avoiding the financial strain of a permanent workforce. A textile sector case shows artisans flexibly using local resources, outsourcing sewing to a tailor shop and employing local unemployed women for assembly. These hires included both personal acquaintances and individuals recruited through community recommendations. This model underscores the reliance of craft production on social networks.

Beyond collaboration within the production process, artisans establish long-term cooperative and mutually beneficial relationships with other stakeholders, including logistics providers and customers. Some artisans use informal logistics strategies, building relationships with couriers to bypass rigid regulations and enhance flexibility. Their high order volume provides stable work for local couriers, creating a mutually supportive dynamic. Customers in the niche market evolve from strangers into loyal followers and dedicated supporters. Artisans noted that their brands attract a dedicated customer base, valuing engagement and recognition over mass-market appeal. Some customers actively provide unsolicited feedback and suggestions for improvement, demonstrating a high level of involvement. Loyal customers drive organic growth by making repeat purchases and referring friends and family. For some loyal customers, their relationship with the artisans evolves beyond mere consumption, leading to business collaborations. For instance, a customer can become the artisan's part-time employer and facilitate entry into a larger commercial network. Customer relationships sometimes translate into investment opportunities, with supporters funding material and technique experiments and innovation. In some cases, customers who have developed a deep connection with the artisan and brand voluntarily help with workshops or actively promote and sell products at markets, reinforcing the emotional bond between artisan and consumer.

5.3. Artisans' Ethical and Responsible Leadership

With accumulation of experience, resources, capital, and influence, artisans expand their focus beyond personal benefits to ethical practices, social responsibility and environment concerns. Ethical leadership can be found on some artisans which are distinguished by their integrity to ensure transparency and sustainability in their work and efforts to preserve and inherit knowledge and skills in crafts. They are also driven by a virtue of altruism, actively return social favours and contribute to the common good (Mousa et al., 2024).

Integrity defines artisan leadership, running through business practices and public engagement. Artisans prioritize honesty and transparency, avoiding exaggerated claims or unfulfilled promises. They maintain the originality of their work, firmly rejecting plagiarism and resisting the substitution of inferior or inauthentic materials. Integrity fosters long-term trust, essential in high-end custom craft, where clients have discerning judgment. Beyond business

ethics, artisans also recognize the growing need for public education in their field. Short-form social media has fueled misconceptions about craft, as unprofessional creators often stage or manipulate demonstrations, misrepresenting skill, effort, and safety requirements. In response to misinformation, artisans actively engage in public discussions, debunk myths, and provide factual corrections, striving to preserve the integrity of their craft while educating a broader audience.

Altruism is exhibited when returning social favors through various initiatives. Artisans actively engage in outreach programs led by local communities, non-profit organizations, and government bodies, providing hands-on craft experiences to marginalized groups such as the elderly and children, often without monetary compensation. Despite the traditionally closed nature of craft knowledge, experienced artisans now increasingly participate in communities, assisting peers and newcomers while also offering free educational content to the public, customers, and craft enthusiasts. These acts of voluntary sharing are often seen as a natural part of artisan lifestyle.

Artisans practice responsible leadership by prioritizing environmental and emotional sustainability, often critiquing mass production. They emphasize lifecycle sustainability and emotional durability beyond immediate product quality. Environmental concerns are evident in their efforts to address raw-material selection, waste and recycling challenges. For example, artisans emphasize the long-term ecological risks of heavy metals in enamel, which can contaminate soil and water, and the non-degradability of ceramic and glass waste. Despite the lack of formal recycling channels, artisans experiment with repurposing defective or discarded materials to minimize environmental impact. They also contribute to raising industry-wide awareness by exchanging insights with peers, engaging with larger enterprises, and sharing their perspectives on social media. Most artisans resist excessive commercial packaging, rejecting short-lived visual appeal in favor of sustainability, even when this conflicts with consumer expectations. These approaches reflect an underlying anti-consumerist philosophy that challenges conventional marketing norms.

6. Discussion and Conclusion

The findings suggest that artisan entrepreneurship represents a unique leadership style that prioritizes authenticity and integrity, with altruism and sustainable responsibility. Unlike traditional entrepreneurial leadership, artisans adopt a collaborative and moral approach, engaging in business and social activities. Their reliance on communities underscores the importance of social capital in sustaining craft enterprises.

Future research could employ quantitative method to verify the characteristics and behaviours identified as artisan leadership. Another valuable direction would be to investigate leadership dynamics in medium-sized craft enterprises, assessing how leadership structures evolve as businesses scale and engage with broader market forces. Further research is needed to explore how policy frameworks and digital transformation influence artisan design and entrepreneurship.

This study explores the leadership and entrepreneurial dynamics of artisan entrepreneurs in China, revealing the complex interplay between personal vision, business strategies, stakeholder collaboration, and ethical leadership in the craft industry. By adopting an inductive research approach, we reveal how artisans navigate the challenges of sustaining a livelihood while maintaining creative autonomy and ethical integrity. Our findings highlight that artisan entrepreneurs are not solely driven by economic motivations but is deeply rooted in personal values, artistic philosophies, and a broader sense of social responsibility. Artisans balance self-expression with economic sustainability while contributing to communities and society, highlighting ethical leadership in creative industries. Supporting these alternative pathways can help evolve craft practices, measuring success beyond finance to include cultural, social, and ethical contributions.

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CATALYSING SUSTAINABLE LEADERSHIP: TRANSFORMING INTERIOR DESIGN THROUGH ETHICAL ENTREPRENEURSHIP

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ABSTRACT | As sustainability increasingly gains importance, the design industry is now at the forefront of addressing environmental challenges, particularly through the lens of sustainability. As the sector evolves, integrating ethical leadership becomes essential for driving innovation that meets aesthetic standards while achieving broader social and environmental goals. This paper examines the role of ethical leadership in sustainable interior design, particularly in selecting and using materials like sustainable textiles. The research is grounded in two qualitative case studies in the UK showcasing the real-world application of ethical leadership within the interior design industry. The first case focuses on a UK-based design firm specialising in the reuse and resale of surplus textiles. This company emphasises waste reduction through recycling, contributing to a circular economy within interior design. The firm prioritises transparency in the supply chain and fosters collaboration with manufacturers and designers. By incorporating surplus materials into commercial projects, they illustrate how design leadership can promote sustainability without sacrificing quality or visual appeal. The second case explores the work of a residential interior design practice, known for using locally sourced and eco-friendly materials. This practice aims to create interiors that are not only visually appealing but also minimise environmental impact by using organic and biodegradable textiles. This approach reveals the challenges of sourcing sustainable materials and educating clients on the long-term value of environmentally responsible choices. The firm's commitment to ethical design extends to advocating for inclusivity and well-being, ensuring that spaces are healthy for both people and the planet.

Both cases underscore the delicate role of ethical leadership in overcoming interior design industry challenges, like the limited availability of sustainable materials and the demand for greater transparency. They each highlight the importance of collaboration between the interior design and manufacturing sectors to achieve sustainability goals. By focusing on the entire lifecycle of textiles, from sourcing to disposal, these leaders are setting new benchmarks in sustainable interior design, aiming for a future that goes beyond compliance to actively shape a regenerative industry.

The study's findings reveal that ethics in design leadership are not merely guiding philosophies, but strategic tools for transforming industry practices. By embedding ethical considerations into every stage of the design process, leaders in the field of interior design can meet clients' aesthetic expectations while contributing to a more sustainable and resilient design industry. Their work serves as a blueprint for other interior designers interested in incorporating ethics into their design practice, proving that a commitment to sustainability can coexist with creativity and innovation.

This paper advocates for a shift in the interior-design leadership model, placing ethics and sustainability at the core of decision-making. As the industry faces increased pressure to address sustainability concerns, the role of ethical leaders becomes ever more essential. This research lends valuable insights to the ongoing discourse around sustainable design, offering practical guidance on how leaders can navigate the complexities of sourcing, transparency, and client engagement. Ultimately, this invokes a reimagined future for design, where design is driven by responsibility and innovation, led by ethical principles.

KEYWORDS | ETHICAL LEADERSHIP, SUSTAINABLE DESIGN, INTERIOR DESIGN, SUSTAINABILITY, SUSTAINABLE TEXTILES, REGENERATIVE DESIGN, DESIGN ENTREPRENEURSHIP, SUPPLY CHAIN TRANSPARENCY, SUSTAINABILITY INNOVATION.

1. Introduction: Framing Ethical Leadership in Sustainable Interior Design

Interior design has long been associated with an emphasis on aesthetics, luxury, and curated user experiences. Yet, with the escalating climate crisis, this perception is undergoing a profound transformation. The ecological impact of material choices, manufacturing processes, and waste management is no longer a secondary issue—it stands as a critical challenge for contemporary interior designers. Sustainability is no longer an afterthought but an integral responsibility. At the heart of this shift is ethical leadership. Ethical leadership in interior design extends beyond mere adherence to sustainability standards; it involves a proactive engagement with strategies that foster a regenerative and ecologically sound industry.

The urgency of integrating ethical leadership into sustainable interior design stems from several pressing issues. The built environment is responsible for nearly 39% of global carbon emissions, with interior finishes, furniture, and fit-outs contributing significantly to this footprint (United Nations Environment Programme, 2019). Additionally, the fast interiors phenomenon, mirroring fast fashion, exacerbates material waste, shortens product lifespans, and fuels unsustainable consumption patterns. The textile industry, central to interior design, remains one of the largest polluters, with synthetic fabrics releasing microplastics into waterways and natural fibres, often requiring intensive chemical treatments (Shen, Worrell & Patel, 2010).

Beyond environmental concerns, ethical leadership in interior design must also address social equity. Supply chain transparency remains a challenge, with many materials passing through multiple intermediaries before reaching designers. Labour exploitation, lack of fair wages, and unsafe working conditions persist within textile manufacturing, particularly in developing economies (Bocken et al., 2014). Ethical leadership, therefore, requires designers to take a holistic approach, ensuring that sustainability efforts extend beyond material sourcing to encompass fair labour practices, circular economy principles, and consumer awareness.

Historically, interior designers have been positioned as creative professionals rather than industry leaders driving systemic change. However, as sustainability moves to the forefront of global discourse, the role of designers is shifting from passive adopters of sustainable materials to active agents of ethical entrepreneurship. Ethical leadership in design is no longer just about making sustainable choices—it is about reshaping industry norms, challenging unsustainable business models, and influencing consumer behaviour.

Designers, by virtue of their work, operate at the intersection of multiple disciplines—manufacturing, supply chains, policy, and consumer engagement. This positions them uniquely to advocate for systemic change, working beyond individual projects to push for industry-wide improvements. Ethical entrepreneurship, in this context, refers to designers taking ownership of the materials they specify, holding suppliers accountable, and integrating transparency into their decision-making processes (Porter & Kramer, 2011). It also means educating clients, shifting the industry from short-term consumerism to long-term sustainability, and redefining the aesthetics of sustainable interiors.

This study investigates how ethical leadership manifests within sustainable interior design by analysing two UK-based firms that have embedded sustainability into their core operations. The research explores:

- The decision-making processes of ethical design leaders: How do they balance sustainability, aesthetics, and financial constraints?
- Challenges in sourcing and implementing sustainable textiles: What obstacles do firms encounter when integrating ethical materials into their work?
- The broader impact of ethical leadership on the design industry: How do these firms influence suppliers, manufacturers, and client expectations?

Through these inquiries, the paper aims to move beyond theoretical discussions of sustainability and present real-world examples of leadership in action. This research also contributes to the growing discourse on design leadership in sustainability by offering a practical, case-based exploration of how firms are implementing ethical practices. While much of the existing research focuses on sustainable materials and circular economy principles (McDonough & Braungart, 2002), less attention has been given to the role of leadership in transforming industry practices. By framing designers as ethical entrepreneurs, this study shifts the focus from materials alone to the decision-making power of designers to influence suppliers, clients, and broader industry norms.

The findings of this research have implications beyond interior design, contributing to the wider conversation on how leadership in creative industries can drive sustainability. As policymakers and consumers demand greater accountability from the design industry, understanding the role of ethical leadership becomes essential for shaping future design education, business models, and material innovations.

2. Navigating Ethical Challenges in Sustainable Design

Sustainable interior design has evolved from a niche concern to an industry-wide priority, yet the transition from aspiration to execution remains fraught with challenges. Ethical leadership plays a pivotal role in bridging this gap, shaping how designers navigate the complexities of sustainable material sourcing, supply chain accountability, and consumer expectations. This section reviews the theoretical foundations of ethical leadership, the evolution of sustainable practices in interior design, the role of textiles in sustainability, and the challenges that hinder their widespread adoption. Finally, it identifies how this study contributes to existing discourse.

2.1. Theoretical Foundations of Ethical Leadership in Design

Ethical leadership, as conceptualised within business and organisational studies, extends beyond compliance with sustainability regulations to proactive, values-driven decision-making. Brown, Treviño, and Harrison (2005) define ethical leadership as the process by which individuals demonstrate and promote integrity, transparency, and responsibility within their professional domains. This model aligns with Porter and Kramer's (2011) framework of "Creating Shared Value" (CSV), which argues that businesses can generate economic success while addressing societal challenges. Applied to interior design, CSV suggests that sustainable practice need not be a financial burden but an opportunity for long-term industry transformation.

From a design perspective, Manzini's (2015) "Design for Social Innovation" explores how creative professionals, including designers, can function as agents of change, embedding ethics and sustainability into their work. Manzini argues that sustainable design is not merely about using eco-friendly materials but rethinking entire systems—from how materials are sourced to how spaces are used and repurposed. This aligns with McDonough and Braungart's (2002) Cradle-to-Cradle (C2C) model, which advocates for circular material flows where waste is eliminated by ensuring that products are either fully recyclable or biodegradable.

Despite these frameworks, research on ethical leadership specifically within the field of interior design remains sparse. While architects and urban planners have engaged in sustainability-driven leadership models, interior designers are often positioned as specifiers of materials rather than strategic decision-makers (Bocken et al., 2014). This paper seeks to reposition designers as ethical entrepreneurs; illustrating how they can influence material supply chains and consumer perceptions through leadership-driven decision-making.

2.2. The Evolution of Sustainable Practices in Interior Design

Sustainable design has undergone significant shifts over the past few decades. In the 1990s, the focus was primarily on energy-efficient buildings and green certification systems such as LEED (Leadership in Energy and Environmental Design). However, as sustainability discourse expanded beyond energy consumption to encompass materials, waste reduction, and ethical labour practices, interior designers faced increasing pressure to integrate these considerations into their work (Stegall, 2006).
Today, sustainability in interior design encompasses several key principles:

- **Material Transparency** – Ensuring full disclosure of material origins, production impacts, and disposal methods.

- **Circular Economy Thinking** – Moving away from linear consumption models toward closed-loop systems where materials are repurposed rather than discarded (Ellen MacArthur Foundation, 2019).
- **Social Equity in Sourcing** – Addressing ethical labour concerns in textile and furniture manufacturing, particularly in global supply chains.
- **Consumer Awareness & Education** – Shifting client expectations from short-term aesthetics to long-term sustainability investments.

Despite these advancements, widespread adoption remains slow. Research indicates that many firms struggle to align sustainable aspirations with economic realities, leading to greenwashing—where sustainability is marketed but not meaningfully implemented (Jones, Wynn & Hillier, 2020). The question, then, is not whether sustainable design matters, but how designers can operationalise ethical leadership to turn sustainability from an ideal into a functional business model.

Recent scholarship across the creative industries offers additional context for understanding how ethical leadership in interior design aligns with broader sustainability movements. As Väänänen et al. (2022) observe in their cross-disciplinary study on ethics in design practice, many designers now see their roles evolving from service providers to environmental and social responsibility advocates. However, they also emphasise the constraints faced by small firms navigating inconsistent policy frameworks and limited client awareness—challenges echoed in the interior design field. Fischer and Reimers (2020), in a state-of-the-field review, note that while sustainability is a growing research focus in interior design, there is still a lack of integration between design education, professional leadership, and sustainable innovation. These findings parallel those in architecture and fashion, where creative entrepreneurs are increasingly positioned as system changers rather than passive implementers (UNCTAD, 2022). Yet, unlike sectors where large firms often drive sustainability through scale and resources, interior design relies heavily on small studios and individual actors, placing even greater importance on ethical leadership at the micro-level. The relevance of these broader creative-sector dynamics strengthens the case for examining how leadership models in interior design can inform and adapt to evolving sustainability demands.

2.3. The Role of Sustainable Textiles in Ethical Sourcing

Textiles are central to interior design, influencing aesthetic, functional, and environmental outcomes. However, the textile industry remains one of the most environmentally and socially problematic sectors, with high levels of water consumption, chemical processing, and waste generation (Shen, Worrell & Patel, 2010). The transition to sustainable textiles has been slow due to several persistent challenges:

- **Chemical Pollution & Resource Use** – Conventional textile production involves toxic dyeing processes, high water consumption, and significant carbon emissions. Even "natural" fibres like cotton have sustainability concerns due to pesticide use and soil degradation (Fletcher, 2013).
- **Microplastics from Synthetics** – Many synthetic textiles release microplastics into the environment, contributing to ocean pollution.
- **Labour Exploitation in Supply Chains** – A significant portion of textile manufacturing occurs in low-wage economies with poor labour protections (Benyus, 2002).

- **Consumer Misconceptions** – Many consumers and clients equate sustainability with visual simplicity, leading to the misconception that sustainable interiors lack luxury or high-end appeal.

To counter these issues, designers are increasingly turning to ethical sourcing strategies:

- **Upcycling & Surplus Material Reuse** – As seen in Firm-A's business model (discussed later in the case study), the reuse of surplus textiles offers a solution to material waste while lowering costs and carbon footprints.
- **Locally Sourced, Biodegradable Textiles** – As exemplified by Firm-B, locally sourced organic textiles can support regional economies while reducing transportation-related emissions.
- **Cradle-to-Cradle Certifications & Material Transparency** – New frameworks help verify sustainability claims, ensuring accountability across the supply chain (McDonough & Braungart, 2002).

2.4. Challenges in Implementation: Supply Chains, Clients, and Costs

While sustainable practices are gaining traction, designers face significant barriers when attempting to implement ethical sourcing at scale.

- **Supply Chain Transparency** – Many suppliers are reluctant to disclose full material compositions, making it difficult for designers to verify ethical claims (Stegall, 2006).
- **Client Expectations & Market Demand** – Many clients remain price-sensitive, prioritising aesthetics over long-term sustainability benefits. Designers often struggle to convince clients of the value proposition of sustainable interiors (Porter & Kramer, 2011).
- **Economic Feasibility for Small Firms** – Many small-to-mid-sized firms lack the financial resources to source premium sustainable materials, creating a disparity where only large firms can afford to implement high-impact sustainability strategies (Bocken et al., 2014).

These barriers suggest that ethical leadership in sustainable interior design requires more than individual action. It necessitates collective industry shifts, regulatory support, and consumer education to create an ecosystem where sustainability is not a niche but a norm.

2.5. Bridging the Gap: Where This Study Contributes

Existing literature largely focuses on sustainable materials, lifecycle assessments, and regulatory frameworks, but research on how design leaders drive sustainability within firms and supply chains remains limited. This study contributes to the discourse in several ways:

1. It shifts the focus from materials to leadership, examining how interior designers function as ethical entrepreneurs, influencing suppliers, clients, and industry norms.
2. It presents two case studies of firms actively embedding sustainability, providing real-world insights into decision-making challenges and opportunities.

3. It explores the role of collaboration and advocacy in ethical sourcing, demonstrating that sustainable interior design is not just a technical challenge but a leadership challenge.

By examining practical, firm-level strategies rather than abstract sustainability principles, this study aims to bridge the gap between theory and practice, offering a clearer roadmap for ethical leadership in interior design.

3. Examining Ethical Leadership in Action: A Qualitative Approach

Understanding how ethical leadership manifests in sustainable interior design requires more than theoretical exploration—it demands an in-depth look at real-world practices. This study adopts a qualitative case study methodology, focusing on two small UK-based firms that have successfully embedded ethical leadership into their sustainability strategies. Both firms serve as examples of how ethical leadership operates in a small business context. By examining their decision-making frameworks, processes, and operational challenges, this research seeks to uncover how ethical leadership is practiced and what insights can be applied to the broader industry.

Participant Selection and Sampling Criteria: The firms were selected through purposive sampling based on their active engagement with sustainability and visibility within UK design networks. The inclusion criteria required that firms: (1) be UK-based, (2) operate in interior design, and (3) demonstrate a clear commitment to sustainable practices either through public communication, project work, or third-party certifications. Additionally, firms were required to have fewer than 10 employees to focus on small-business dynamics. The selection aimed to reflect different approaches to ethical leadership, Firm-A being systems-driven and Firm-B being client-driven, providing comparative insights into leadership styles within sustainability.

Research Design and Methodological Rationale: The use of a qualitative case study approach allows the complexity of ethical leadership within sustainable interior design to be explored in greater depth. Unlike quantitative methods, which often fail to capture the richness of context-specific practices, case studies offer detailed, real-world insights into how sustainability is operationalized (Yin, 2018). Given that ethical leadership is not a static, easily measurable variable but a dynamic, evolving practice, qualitative methods allow for a more nuanced exploration of how designers navigate moral dilemmas, industry constraints, and leadership responsibilities.

To gain a comprehensive understanding of leadership practices, the study utilized three primary data collection methods: semi-structured interviews, document analysis, and observational insights. These methods were chosen to provide a nuanced view of how ethical leadership is enacted, focusing on the tensions, trade-offs, and strategies involved in sustainable decision-making. By combining multiple data sources, the study enhances its credibility, ensuring that findings are grounded in actual practice rather than abstract ideals.

The two firms selected for this case study represent distinct yet complementary approaches to ethical leadership in sustainability. Firm-A is a design firm specializing in the reuse and resale of surplus textiles, actively engaging with circular economy principles. This firm prioritizes material transparency, supply chain collaboration, and minimizing industry waste. Its leadership model is driven by advocacy and systemic

change, aiming to challenge the disposable culture of the interior design sector. Firm-B, on the other hand, is a design firm that emphasizes local sourcing and the use of biodegradable materials. Its leadership focus is on educating clients about the long-term value of sustainable design choices, shaping consumer perceptions and expectations. Unlike Firm-A, which operates mainly at an industry-wide level, Firm-B's ethical leadership is client-focused, aiming to directly influence sustainability through consumer engagement.

These two firms were selected for their contrasting but complementary approaches to ethical leadership in sustainability —Firm-A, which advocates for industry-wide systemic change, and Firm-B, which fosters sustainability through consumer education and direct practice. Their approaches provide valuable insights into different ways ethical leadership can be enacted within the field.

Interview Protocol and Data Collection Procedures: Data collection consisted of three core strategies: semi-structured interviews, document analysis, and observational insights. Semi-structured interviews were conducted with key decision-makers from each firm, including founders, lead designers, and sustainability coordinators. Each participant received an information sheet and consent form outlining the study's aims and ethical safeguards. Interviews lasted between 45–60 minutes and were conducted via Microsoft Teams.

The semi-structured interview guide was developed iteratively, based on pilot interviews and literature insights, and included open-ended questions on leadership practices, material choices, ethical dilemmas, and client engagement. Questions were intentionally phrased to avoid leading responses and to accommodate varying levels of sustainability expertise. This approach ensured comparability across interviews while allowing participants to freely express their experiences and values.

Alongside semi-structured interviews, firm-related documents (e.g., sustainability policies, client brochures, and supplier correspondence) were reviewed to cross-verify claims made in interviews. Additionally, virtual tours and field notes from site visits were used to observe firm practices and contextualise participant narratives.

Data Analysis Process: The collected data was analysed using thematic analysis, a method particularly suited to identifying underlying patterns and themes in qualitative data (Braun & Clarke, 2006). Themes emerged inductively through a rigorous coding process, focusing on key areas such as decision-making patterns, leadership styles, barriers to sustainability, and stakeholder influence. Thematic analysis provided the study with the depth necessary to uncover the motivations, pressures, and strategies that shape ethical leadership in sustainable interior design.

Ethical Considerations: Ethical considerations were integral throughout the research process. Given the sensitive nature of business decisions and strategies, confidentiality and anonymity were maintained for all participants. Informed consent was obtained from all interviewees, who were briefed on the research aims and their right to withdraw their data at any time. Firm names and other identifying details were anonymized to preserve confidentiality while maintaining the richness of their insights. Throughout the study, the researcher remained reflexive, acknowledging the value-laden nature of sustainability issues. Bias was minimized through triangulation, ensuring that the analysis remained rooted in participants' experiences rather than researcher preconceptions.

Ensuring Credibility and Triangulation: To enhance credibility and reduce bias, triangulation was employed across interview data, documentary sources, and

observational material. Thematic convergence was actively sought by comparing interview narratives with firm-generated materials and visual observations. This methodological triangulation helped verify claims, deepen context, and capture potential inconsistencies. Data were analysed using reflexive thematic analysis (Braun and Clarke, 2006), supported by ATLAS.ti software, which enabled systematic coding, memo writing, and concept mapping. Researcher reflexivity was embedded throughout, with a critical awareness of positionality maintained through journaling and supervision feedback loops.

Summary of Methodological Integrity: Through strict adherence to ethical protocols and rigorous data analysis, this study provides valuable insights into the practice of ethical leadership in sustainable interior design, contributing to a more informed and responsible approach to design in the face of environmental challenges.

4. Insights from the Field: Ethical Leadership in Practice

The notion of ethical leadership in sustainable interior design is often discussed in abstract terms, yet its practical application is far more complex and nuanced. While many firms aspire to sustainability, the realities of supply chain constraints, financial pressures, and client expectations create tensions that test even the most committed leaders. The following case studies provide insight into how two UK-based firms—each with distinct approaches—have embedded ethical leadership into their business practices. One firm has positioned itself as a pioneer in circular design, repurposing surplus materials for commercial interiors, while the other has taken a more localised approach, prioritising ethically sourced, biodegradable textiles. Together, they offer a compelling look at the possibilities and challenges of leading with sustainability.

4.1. Case Study 1: A Circular Approach to Sustainable Interiors

Firm-A has built its reputation around the principles of circularity, focusing on the reuse and resale of surplus textiles. Operating within an interior design context, the firm actively sources discarded high-quality fabrics from manufacturers, fashion houses, and interior projects, ensuring that these materials are reintegrated into new design schemes rather than ending up in landfills. Their business model aligns with the principles of waste reduction, lifecycle extension, and supply chain transparency, positioning them as an ethical leader in an industry still heavily reliant on virgin materials.

Their sustainability strategy is twofold: first, to create an alternative supply chain that values pre-existing materials over newly produced ones; and second, to educate designers and clients on the environmental and aesthetic benefits of circularity. By curating an inventory of premium surplus textiles, the firm not only provides a solution to waste but also challenges the assumption that sustainability compromises quality.

This process is illustrated in Figure 1, which outlines Firm-A's circular workflow—from sourcing surplus textiles to installing them in new interiors and communicating their environmental value to clients.

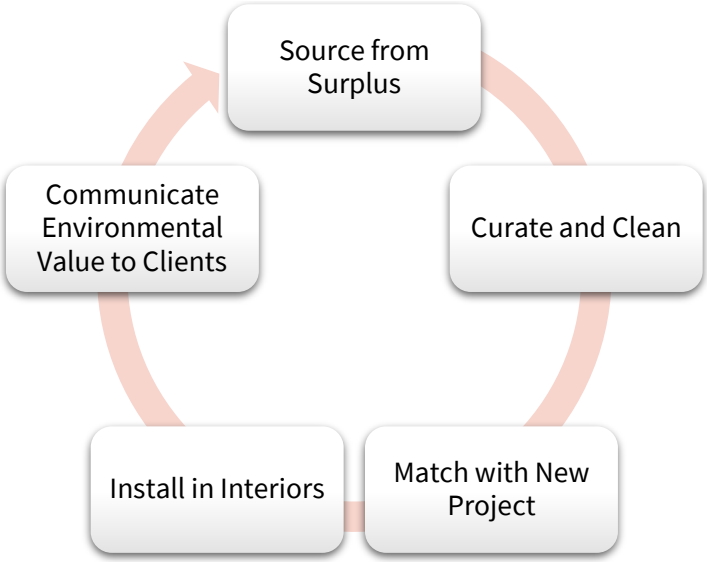

Figure 1. Circular Design Workflow at Firm-A: From surplus sourcing to interior integration and client engagement.

Leadership at Firm-A is highly collaborative, emphasising industry-wide engagement rather than operating in isolation. Their approach involves active partnerships with manufacturers, suppliers, and designers to promote more transparent material flows. Unlike firms that treat sustainability as an internal commitment, Firm-A advocates for systemic change, encouraging competitors and industry peers to reconsider their procurement strategies.

Transparency is a cornerstone of their leadership philosophy. By openly disclosing the origins of their materials and the environmental benefits of reuse, they have cultivated a reputation for trustworthiness in an industry where greenwashing is a persistent issue. Their commitment to educating stakeholders—clients, manufacturers, and fellow designers—reinforces their role as ethical leaders, driving demand for alternative sourcing models.

Despite their success, Firm-A faces several critical challenges. One of the most pressing is the unpredictability of material availability. Because they rely on surplus stock, their inventory fluctuates, making it difficult to guarantee the same textiles for large-scale commercial projects. To mitigate this, they have developed flexible design strategies that integrate diverse materials without compromising coherence or quality.

Cost perception is another challenge. Many clients assume that repurposed textiles should be significantly cheaper than virgin materials, failing to account for the logistical costs of sourcing, curating, and restoring surplus fabrics. To counter this, Firm A has focused on storytelling as a value proposition, framing each textile's journey as part of a larger sustainability narrative.

Firm-A's influence extends beyond its immediate business operations. By proving that a circular economy model is viable within high-end commercial interiors, they have inspired other firms to explore similar strategies. Their leadership is not just about their own ethical choices but about transforming industry norms, making sustainable design more accessible and desirable.

4.2. Case Study 2: Locally Sourced, Ethically Designed Interiors

Firm-B takes a different route to sustainability, prioritising locally sourced, organic, and biodegradable materials for interiors. Their philosophy is rooted in the belief that sustainability should not only be about reducing harm but actively contributing to environmental and social well-being. By sourcing textiles from local artisans, independent weavers, and small-scale producers, they ensure that their supply chain supports ethical labour practices and regional economies.

Unlike Firm-A, which focuses on waste reduction, Firm-B is deeply invested in material purity. Their commitment to organic textiles and non-toxic dyes stems from both an environmental and a health-conscious perspective, as they advocate for interior spaces that are not only sustainable but also beneficial for occupant well-being.

Sourcing high-quality, sustainable textiles remains one of the biggest challenges for Firm-B. The global textile industry is dominated by large-scale, cost-driven production, making it difficult for smaller, ethical suppliers to compete. Additionally, organic and biodegradable materials often come at a higher price point, which can deter cost-sensitive clients.

To navigate these challenges, Firm-B has taken on a dual role as both a design practice and an advocate. They work closely with suppliers to build direct trade relationships, ensuring fair compensation for artisans while securing exclusive materials. Additionally, they actively lobby for greater industry recognition of ethical sourcing, pushing for certifications and policy incentives that support sustainable textile production.

One of Firm-B's most innovative leadership strategies lies in client education. Unlike commercial projects, where sustainability decisions are often made at the corporate level, residential interiors involve deeply personal choices. Many clients are unfamiliar with the impact of conventional textiles, and Firm-B sees education as a critical leadership tool.

Rather than simply presenting eco-friendly options, they integrate storytelling into their design process. Clients are given insights into who made their textiles, where they came from, and what impact their choice has on the environment and local economies. This method fosters a deeper emotional connection between consumers and their interiors, leading to more informed, conscious decision-making. This process is summarised in Figure 2, illustrating how Firm-B combines ethical sourcing with narrative-driven client engagement.

Figure 2. Ethical Sourcing and Storytelling Process at Firm-B: Illustrating the integration of artisan production, material traceability, and consumer education.

Firm-B's leadership extends beyond individual projects. By promoting local production and responsible sourcing, they are helping to shift consumer expectations around sustainability. Their work highlights how leadership in sustainable interior design is not just about material selection but about changing mindsets—both within the industry and among end-users.

4.3. Comparative Insights & Broader Implications

Commonalities in Ethical Leadership Across Both Firms

Despite their differing approaches, both Firm-A and Firm-B demonstrate key commonalities in their leadership strategies:

- Commitment to transparency: Both firms emphasise openness about their processes, materials, and sustainability efforts.
- Education as a leadership tool: Whether targeting clients (Firm-B) or the industry at large (Firm-A), both firms use knowledge dissemination as a driver of change.
- Resilience in overcoming barriers: Both have encountered supply chain difficulties but have adapted through flexible strategies and strong stakeholder relationships.

Differences in Strategy and Execution

While their ethical commitments align, the firms diverge in their execution:

- Firm-A operates within a commercial, industry-focused model, while Firm B engages directly with individual consumers.
- Firm-A's leadership is systemic, influencing supply chains and corporate practices, whereas Firm-B's leadership is experiential, transforming how individuals interact with sustainable interiors.
- Circularity defines Firm-A, while material purity and ethical sourcing define Firm B.

Lessons for the Wider Industry

These case studies highlight a spectrom of approaches to ethical leadership in sustainable interior design, offering valuable lessons for practitioners:

- Ethical leadership is multifaceted—it can manifest in supply chain transformation, direct advocacy, or client education.
- Sustainability is not a one-size-fits-all solution—firms must tailor strategies to their market, values, and operational constraints.
- Leadership is about influence, not just implementation—the ability to shift industry norms, shape client expectations, and advocate for systemic change is just as critical as adopting sustainable practices internally.

Table 1. Two Paths to Ethical Practice: A Comparative Leadership Framework.

DIMENSIONS	Firm-A: Circular Model	Firm-B: Local Ethical Sourcing
Bussiness Model	Reuse/resale of surplus textiles	Locally sourced biodegradable textiles
Leadership Focus	Systemic industry advocacy	Client education and sensory awareness
Key Strategy	Supply chain collaboration	Fair trade and transparent sourcing
Main Barrier	Inventory inconsistency, pricing bias	Limited supply, client misconceptions
Leadership Tool	Storytelling + transparency	Narrative-based material storytelling

Importantly, while these case studies illustrate ethical leadership in small design firms, the principles they demonstrate are not exclusive to niche operations. Scaling such strategies across larger organisations may require additional infrastructure, such as formalised sustainability teams, supplier auditing systems, or policy-based procurement criteria. Nevertheless, the core approaches—such as transparent sourcing, collaborative relationships, and stakeholder education—can inform corporate-level sustainability roadmaps. Larger firms may also be better positioned to influence industry policy by participating in certification initiatives or lobbying for ethical material standards, turning isolated practices into sector-wide norms.

Together, these insights affirm that ethical leadership is not just about doing better design—it is about redesigning the very frameworks within which design operates.

5. Redefining Leadership for a Sustainable Future

As the interior design industry grapples with the growing urgency of sustainability, ethical leadership is emerging not as a mere guiding principle but as a pragmatic necessity. This study has explored how leadership in sustainable interior design extends beyond aesthetic and functional concerns, shaping industry standards, client perceptions, and material supply chains. Through the lens of two distinct case studies, we have seen how firms can integrate ethical leadership in different but equally impactful ways—whether by advancing circular economy models or championing local, ethically sourced materials. The question that remains is not whether ethical leadership matters, but how designers can push the boundaries of sustainability in an industry that often resists change.

At the core of this study was an inquiry into how ethical leadership manifests in sustainable interior design and what challenges and strategies shape its implementation. The findings address several pressing concerns:

- **How do interior design firms integrate ethical leadership into their sustainability strategies?**
  The case studies reveal two primary models: a circular economy approach

that prioritises reuse and waste reduction, and a localised sourcing strategy that focuses on material purity and ethical labor practices.

- **What challenges hinder the adoption of sustainable practices, and how do ethical leaders navigate them?**
  Common challenges include supply chain instability, cost perceptions, and client resistance—each of which was met with strategic responses, such as flexible sourcing, transparent communication, and educational initiatives.

- **How does ethical leadership influence broader industry norms?**
  Leadership in sustainable design extends beyond individual business models; it has the power to reshape industry-wide expectations, fostering greater transparency, client awareness, and long-term commitment to sustainability.

5.1. Key Takeaways: Ethical Leadership in Action

A few crucial themes emerge from this research, offering insights for both academics and practitioners:

- Ethical leadership is adaptive, not prescriptive. There is no single "right" way to integrate sustainability into design practice. Some firms may focus on circularity, while others may emphasise responsible sourcing—but both approaches contribute meaningfully to a regenerative design ecosystem.

- Education is a leadership tool. Whether engaging clients or pushing for industry-wide change, knowledge-sharing is fundamental. Designers who embed education into their practice not only influence decision-making but also reshape sustainability expectations for future projects.

- Transparency builds credibility. Greenwashing remains a persistent issue in the design sector. Firms that prioritise open communication about their materials, processes, and limitations establish trust and set a higher bar for ethical responsibility.

- Sustainability requires resilience. Implementing sustainable strategies is rarely seamless. Both firms examined in this study faced resistance—be it from clients hesitant about costs or from supply chains that lacked consistent ethical options. Ethical leadership, in this context, is about persistence and problem-solving rather than assuming an ideal system already exists.

5.2. Future Directions: Expanding the Conversation

While this study provides valuable insights, it also raises further questions that warrant deeper investigation. The challenges of scaling sustainable models remain largely unresolved—both case study firms succeeded within niche markets, but what happens when sustainability needs to be mainstreamed?

- Future research could explore scalability strategies, examining how firms transitioning from boutique to large-scale operations maintain their ethical commitments.

- Investigating how ethical leadership practices translate within larger commercial

firms, especially those with global supply chains, could reveal both opportunities and structural constraints to industry-wide transformation.

- Another crucial area is policy and regulation—how might government incentives or industry-wide certifications support ethical sourcing and circular design?
- Finally, there is an educational gap in interior design training. How can ethical leadership principles be embedded into design curricula to ensure that future professionals enter the industry with a sustainability-first mindset?

5.3. Final Thoughts: Designing for Responsibility

Ultimately, this research reinforces the idea that interior designers are more than just creators of spaces—they are facilitators of change. Their choices affect not only aesthetics but also material flows, labour conditions, and environmental impact. Ethical leadership in sustainable design is not a luxury; it is an obligation to the future of the industry and the planet.

For sustainability to become the standard rather than the exception, leadership must be proactive, transparent, and unwavering. Designers must continue to challenge norms, educate stakeholders, and innovate within their constraints. The question is not whether ethical leadership can reshape the future of interior design—it is whether designers will rise to meet the challenge.

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CULTIVATING ETHICAL LEADERSHIP IN DESIGN START-UPS IN SOUTH AFRICA: AN ENTREPRENEUR'S PERSPECTIVE

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ABSTRACT

Given South Africa's high youth unemployment rate of 60 percent and overall unemployment rate of 34 percent, entrepreneurship has become a critical pathway for design graduates. However, start-up businesses face significant challenges, with many failing within the first five years, often due to leadership and succession planning issues (Adeniran and Johnston, 2011).

Leadership, recognized as a set of qualities vital to business success has been widely discussed in academic literature, particularly in European, North American, and Chinese contexts. While international design companies focus on mitigating design complexities, South African design start-ups face unique challenges. Similarly, ethical leadership, though extensively studied in corporate settings, has been less explored from the perspective of design entrepreneurs in South Africa.

This paper presents exploratory research using data from a focus group discussion with design entrepreneurs to gain insights into ethical leadership in the local context. The authors have drawn upon Spence et al.'s (2001) "four frames" to guide a focus group discussion with fashion, jewellery, product, and visual communication design entrepreneurs about their experiences regarding ethical leadership.

The findings are framed around four key drivers of ethical behavior affecting South African design entrepreneurs: subsistence, enlightened self-interest, profit-maximization, and social priority. Based on these insights, recommendations are made as catalysts for further research on the cultivation of ethical leadership that is both culturally and contextually appropriate.

KEYWORDS | ETHICAL LEADERSHIP, SUCCESSION PLANNING, ENTREPRENEURSHIP, DESIGN

1. Introduction

Leadership is defined by qualities that drive business success and ethical leadership involves aligning business decisions with values and morals increasingly recognised as integral to building trust, fostering sustainability, and navigating complex global and organisational challenges.

South Africa's youth unemployment rate is 45.5% (Stats SA, 2025). Research by Metu et al. (2019) indicates similar youth unemployment in Sub-Saharan Africa, while the African Development Bank (2018) reports that only 3 million formal jobs are created annually, compared to 12 million new job seekers. With a youth unemployment rate much higher than the global average of 10.9% (Baro and Bianchi, 2023) these statistics confirm that the South African education system prepares students for a job market with limited opportunities. In this context, entrepreneurship has become a critical pathway for design graduates.

In South Africa, entrepreneurship is a necessary practical solution for economic survival. Many entrepreneurs start businesses for immediate financial gain rather than calculated risk-taking or innovation reflected in the necessity-driven entrepreneurship model found in developing countries, in which limited career options led to small, informal businesses with low entry barriers but minimal innovation (Reynolds et al., 2005; Shane, 2003; Fairlie and Fossen, 2018).

In South Africa, research on ethical leadership has been explored from a corporate perspective, with limited focus on entrepreneurship. In this paper, the authors examine how South African design entrepreneurs cultivate ethical leadership in start-up businesses.

2. Literature

A published systematic review on ethics and entrepreneurship (Uriarte et. al. 2024) was used as a starting point for this paper in which the authors respond to the identified need for further research in ethical entrepreneurship in diverse social and cultural contexts such as South Africa. Uriarte et. al. Indicate that out of the 516 papers on ethics and entrepreneurship published between 1988 and 2023, only one was connected to South Africa.

2.1 Designers as Entrepreneurs.

Design-based methods including non-linear approaches to problem-solving, organizational culture, and business partnerships, have been identified as key drivers of

innovation and entrepreneurial success (Schuld et al., 2023; Rose et al., 2021). Schuld et al. (2023) propose a conceptual framework for South African entrepreneurs, emphasizing the role of design thinking and bricolage. Bricolage is defined by four competencies: a dynamic approach to resource scarcity, creative resource grouping techniques, the utilization of available resources, and collaboration with external stakeholders (Witell et al., 2017). In resource-constrained environments, entrepreneurial bricolage is essential for creating value by utilizing accessible resources, especially in fostering entrepreneurial opportunities (Welter et al., 2016). Similarly, Simba et al. (2021) argue that bricolage is especially relevant in emerging markets, where firms rely on it to navigate resource scarcity and establish unique relationships. Innovation is influenced by network activation, as the integration of resources and co-creation with stakeholders can enhance the transformation of ideas into practical solutions (Frow et al., 2015).

2.2 Ethics

Carroll's (1979, 1991, 2016) pyramid framework for Corporate social responsibility (CSR) is another key element influencing ethical entrepreneurship and leadership; this framework encompasses four layers: economic, ethical, philanthropic, and legal responsibilities. While legal responsibilities emphasize adhering to laws and regulations, ethical responsibilities involve upholding moral principles beyond legal compliance.

Spence and Rutherford (2001) further expand on CSR with their four-frame model of business ethics for entrepreneurs. This model explores the relationship between profit and social responsibility, illustrating how businesses can align ethical actions with long-term success. The frames include Profit Maximization, where profit and social objectives are seen in opposition; Subsistence, where long-term survival is prioritized over immediate profit; Enlightened Self-Interest, where socially responsible actions are used strategically for marketing or public relations purposes; and Social Priority, where social values are integrated into the business as a long-term strategy.

Some critics argue that ethical business practices can be costly and difficult to implement, especially for small businesses with limited resources (Visser et al, 2010). The challenges of ensuring fair practices, especially in global supply chains, can result in trade-offs between ethics and profitability. Additionally, some businesses may struggle to implement ethical practices consistently due to pressures from competitors and market demands (Dzomonda and Fatoki, 2017, Fisman et al., 2006).

3. Method

A purposive sampling method was used to identify participants for a focus group discussion to obtain representation from the fields of fashion, product, jewellery and visual communication design. After obtaining ethical clearance from our university's research ethics committee, participants were approached for their willingness to take part in a recorded focus discussion.

According to Javis and Barberena (2008) between six to eight participants constitute a

good size for a focus group discussion. For this paper, participants were included if they are practicing designers that have started their own business designing, producing, and selling their products. In total 10 participants were invited to participate; in this paper we include the data from eight of the 10 participants as it was found in the discussion that two of the participants were not in fact design entrepreneurs. Written consent was obtained from the participants as indicated in Table 1 below.

Table 1. List of participants approached for the focus group discussion.

Participant A	Product	Product entrepreneur partnering with manufacturers (excluded based on field)
Participant A1	Product	Purchases and resells clothing and furniture items through social media. (excluded based on field)
Participant B	Fashion	Designs, manufactures, and sells garments directly to clients and online through social media (employs 10 staff).
Participant C	Fashion	Designs, manufactures, and sells garments directly to clients and online through social media (employs 2 staff).
Participant D	Jewellery	Designs Manufactures and sells jewellery directly to clients and online through social media. (works alone)
Participant E	Jewellery	Designs, manufactures, and sells jewellery directly to clients and online through social media. (works alone)
Participant F	Product	Design and production of products for clients.
Participant G	Fashion	Designs, manufactures, and sells garments directly to clients and online through social media (works alone).
Participant H	Jewellery	Designs, manufactures, and sells jewellery directly to clients and online through social media. (employs one intern)
Participant I	Visual communication Design	Freelance designer (works alone)

4. Discussion

Spence and Rutherford's (2001) "four frames" or priorities, were used to draft a discussion instrument with questions as prompts. The participants were encouraged to reflect on their own experiences as design entrepreneurs. The four frames were used as a method for the owner manager to reflect on how they experience what they do in relation to the context. The responses were transcribed and then the data sorted and thematically coded (Naeem et al., 2023) before mapping onto the four frames model.
In this section the findings are presented according to these frames.

4.1 Career choices and entrepreneurial motivations

The participants cited passion, financial stability, external influences, and opportunity gaps when choosing their entrepreneurial paths. This aligns with career development theories,

entrepreneurial motivation models, and opportunity recognition frameworks that explain why individuals transition into entrepreneurship.

> "I just followed my passion, and I love looking good" (Participant B).

> "There's my passion, which is, I think, the main thing" (Participant D)

Many individuals pursue business not solely for financial gain but due to a personal interest in the industry, aligning with Deci & Ryan's (1985) self-determination theory, which links intrinsic motivation to greater engagement and persistence. Cardon et al. (2009) found entrepreneurial passion drives creativity, resilience, and success, while Baum & Locke (2004) argue entrepreneurs driven by intrinsic passion outperform those motivated by financial rewards. Duckworth et al. (2007) link grit (passion and perseverance) to long-term success. Authors caution that obsessive passion can lead to burnout (Dempsey and Sanders, 2010; Chell, 2007.

Our findings suggest some entrepreneurs were influenced by family ties to the fashion industry, while others pursued entrepreneurship out of passion or as a necessity due to South Africa's high unemployment and limited job opportunities. External factors, such as labour market conditions, were also cited as influential. This aligns with Super's Career Development Theory (1969), which suggests career choices evolve from personal interests, societal expectations, and socio-economic factors. Lent et al. (1994) emphasize the role of family role models, as seen in one entrepreneur who initially pursued fashion secretly despite parental expectations.
Hodkinson & Sparkes (1997) argue career choices are shaped by both socio-economic conditions and personal ambition. Gottfredson's Theory (1981) posits that while environmental factors influence career paths, some individuals later pursue their passions. Savickas (2005) suggests individuals actively shape their careers despite external pressures. Kruger (2000) add that entrepreneurship is often chosen as an alternative when dissatisfaction with current roles arises.
While family influence is a common motivator, career aspirations evolve over time, leading individuals to explore new opportunities. For instance, one entrepreneur initially planned a career in human resources but turned to entrepreneurship due to limited job prospects.

> "I started a mobile kitchen where I was selling food around town. This business that I'm currently doing now grew from the mobile food business I had started earlier." (Participant C)

In South Africa, entrepreneurship often becomes a practical solution for economic survival. This reinforces the idea that many survivalist entrepreneurs start businesses primarily for immediate financial gain rather than engaging in calculated risk-taking and innovation. In developing countries, people frequently enter entrepreneurship out of necessity due to a lack of viable career option resulting in small, informal businesses with minimal entry barriers, leading to a saturated market with limited innovation (Reynolds et al. 2005, Fairlie and Fossen, 2018, Shane 2003).

> "For me, I would be honest with you. The reason I started the business is because I was out of job, so I wanted something so that I can earn a living." (Participant B)

While all business owners may be considered entrepreneurs in a broad sense, those who start businesses out of necessity often struggle to scale into small and medium-sized enterprises. Minniti (2008) found that necessity-driven businesses tend to have higher failure rates compared to innovative, growth-oriented startups. Similarly, Shane (2003) asserted that businesses born from opportunity are more likely to achieve long-term success than those established purely for survival.

> "...to combine creativity with economics, offering unique, high quality fashion designs that cater for the niche market. The goal to build a profitable brand that resonates with customers. "(Participant B)

4.2 Profit maximisation for design start-ups

Some business owners expressed confidence in their profitability, while others recognized the need for further growth. Statements like "Yes, most definitely" and "Yeah, I regard my business as a profitable entity" indicate that profitability is a key part of their business models, supporting Shane's (2003) view that niche markets can achieve profitability through effective positioning.

One participant noted, "Yes, but it needs to grow for sustainability," suggesting that while profits exist, growth is necessary for long-term stability. This aligns with Reynolds et al. (2005), who argue that profitability in start-ups requires constant adaptation to market demands.

Another entrepreneur said, "Yeah, I'd say for the moment. I am at least making a profit...certain things are on a slow burner," indicating that scaling profitability takes time and strategy. Fairlie and Fossen (2018) argue that small businesses in developing economies, especially in creative industries, face slow growth due to market saturation and limited resources.

4.3 Strategies used by design entrepreneurs to maximize profit

Design entrepreneurs use social media and e-commerce platforms to boost profitability, along with time management and productivity optimization. These strategies align with marketing literature on product expansion, digital presence, and operational efficiency. Product diversification, including seasonal collections and limited-edition designs, is a common growth tactic in creative industries. Kotler & Keller (2016) argue that diversification captures new customer segments, while limited-edition items create urgency (Cialdini, 2001).

> "Strategies include expanding product lines, leveraging e-commerce platforms, collaborating with influencers, and targeting international markets. Seasonal connection and limited addition designs."

Entrepreneurs' use of digital platforms reflects Chaffey & Smith's (2017) view that digital channels offer cost-effective global reach. Influencer marketing also plays a role, with Kapitan & Silvera (2016) noting that influencers build brand credibility. Social media engagement aligns with relationship marketing theory (Morgan & Hunt, 1994), showing

that direct brand-consumer interactions drive success.

One entrepreneur highlights community engagement beyond commercial activities, which aligns with corporate social responsibility (CSR) literature. Carroll (2016) suggests that businesses benefit from engaging with communities as it builds brand reputation and trust. Authenticity and values-based branding are also important as consumers gravitate toward brands that share their social and ethical values (Holt ,2004).

> "The influencers are the key sector in the industry and trying to utilize more of the ecommerce. Platforms and also going out there in the communities, doing some community engagement so that people, they can also learn about my principles outside my brand. I'm also doing like commentary target your ties and the politicians for the schools" (Participant B).

Another entrepreneur focuses on productivity and resource management, emphasizing the challenges of sole entrepreneurship. Drucker (1999) states that time management and resource optimization are fundamental to business success. Lean management principles (Womack & Jones, 1996) suggest that reducing waste and streamlining operations can significantly improve efficiency and profitability :

> "Strategies. I suppose looking at ways to maximise your productivity. Using / utilising your materials in a careful way, so you don't waste..." (Participant B)
>
> "...you really need to look at time management. " (Participant D)
>
> "Social media a little bit more, strategically" (Participant E).
>
> "Since we are in the age of social media. I would try content marketing and investing in equipment and stay on top of trends" (Participant I).
>
> Diversifying our revenue streams so when one takes a knock due to seasonal or technological changes we can survive" (Participant F).
>
> "Creating a new line of jewellery for my brand and setting up an e-commerce platform where jewellery will be sold" (Participant H).

Drawing from the verbatim responses, design entrepreneurs demonstrate a mix of hands-on experience and growing strategic insight. While some are already utilizing tools like digital marketing, influencer partnerships, and product diversification, others acknowledge the need to enhance areas such as social media strategy and operational effectiveness. Interestingly, although most rely heavily on social media, only a small number mention increasing or diversifying their income streams. Furthermore, it is notable that design entrepreneurs are staying informed about broader macroeconomic trends.

4.4 Profit or Survival driven entrepreneurship

The responses highlight themes of necessity-driven entrepreneurship, social responsibility, sustainability, and scalability, aligning with theories such as necessity vs.

opportunity entrepreneurship (Reynolds et al., 2005), social entrepreneurship (Marti & Marti, 2006), and growth strategies (Porter, 1980). One participant shared that their business was founded out of necessity to create income while pursuing a passion for fashion. This reflects necessity-driven entrepreneurship, where businesses are born out of financial constraints and lack of job opportunities (Reynolds et al., 2005). The GEM Report (2019) notes necessity-driven businesses play a key role in developing countries' informal sectors, contributing to economic resilience (Brixiova et al., 2020; Ndemo & Weiss, 2016).

Another participant emphasized creating opportunities for students and community members while prioritizing asset ownership and profit. This aligns with social entrepreneurship, which aims to create both economic value and social impact (Mair & Marti, 2006). Carroll's (1991) CSR model stresses balancing economic, legal, ethical, and philanthropic duties, while Yunus (2007) advocates reinvesting profits for sustainable impact.

A third participant discussed maintaining a design ethic while adapting to change, acknowledging that success requires iteration, which aligns with design thinking (Brown, 2015) and the circular economy (MacArthur, 2015). Schaltegger et al. (2016) argue businesses driven by sustainability must innovate to stay competitive. Many South African design entrepreneurs, however, have yet to fully integrate sustainability into their models.

One jewelry entrepreneur discussed the challenge of scaling from informal markets to a permanent retail space, reflecting location theory (Hotelling, 1929) and expansion strategies (Porter, 1980). This entrepreneur also mentioned the potential to secure a permanent retail space, which aligns with Kirzner's (1997) emphasis on identifying expansion opportunities and Porter's (1985) view on strategic location for boosting sales and visibility. These responses show that while survival is the immediate focus, some entrepreneurs are thinking strategically about long-term growth.

Entrepreneurs highlighted a lack of separation from their business, a common challenge in small businesses and creative industries. They often become emotionally intertwined with their businesses, affecting brand recognition, growth, and sustainability. These insights align with personal branding and business identity literature.

> "Currently I do not have a separate identity for business" (Participant ABCDEFGHI).

This response suggests the entrepreneur's business lacks a distinct brand identity, with customers associating it more with the individual than as a standalone entity. Keller (1993) emphasizes that strong brand identity is key for customer recognition and differentiation, while Aaker (1997) notes it fosters emotional connections and helps maintain professional boundaries. De Chernatony (2010) argues that businesses without independent branding struggle to scale, as clients link the product/service to the entrepreneur rather than the company. Responses indicate that small businesses often start as personal brands but eventually transition into separate entities. Goffee & Scase (1989) who suggests that small business owners often struggle with the balance between creative freedom and commercial viability, which can affect business growth and clarity.

> "I do believe that other people who are buying or using our services is because

> they know me as their own and not necessarily the business" (Participant D).

Some entrepreneurs noted that a strong personal connection with customers fosters brand loyalty but also limits scalability. As the "face" of their business, entrepreneurs face challenges in delegation and succession planning. Montgomery and Ramus (2011) argue that brand independence is essential for business sustainability, as relying solely on personal reputation can limit expansion.

> "The two became so intertwined, I think that's part of the reason I had to cut and move on" (Participant).

The above response suggests that emotional involvement in the business can lead to burnout and strategic confusion. Many creative entrepreneurs struggle with separating their artistic identity from their business operations, affecting decision-making and long-term sustainability. Cardon et al. (2009) discussed entrepreneurial passion, stating that while passion can drive business success, it can also result in over-identification with the business, leading to emotional strain.

Separating the entrepreneur from the business allows for scalability, delegation, and long-term sustainability. For instance, Kotler & Keller (2012) emphasize that brand differentiation is crucial for businesses to grow beyond individual founders. Gartner (1990) suggests that successful entrepreneurs develop clear operational structures that allow them to separate personal identity from business functions.

The overall finding highlights a lack of separation between personal and business identity, which can limit growth, scalability, and emotional well-being. This issue is well-documented in entrepreneurship and branding literature, emphasizing the importance of establishing a clear brand identity and structured business operations.

4.5 Wealth from an entrepreneur's perspective

Entrepreneurs offer varying perspectives on generating wealth and sustaining growth, focusing on investment-driven growth, asset ownership, value creation through curation, and brand differentiation. These themes align with theories on entrepreneurship, monetary management, and value creation, highlighting the importance of investment, asset accumulation, and unique market positioning.

One entrepreneur said, "It creates its own wealth by reinvesting more," reflecting a self-reliant model in which reinvestment fuels growth. This aligns Ferreira et al., (2013) view that entrepreneurial success depends on continual reinvestment and innovation. Kor (2004) also argued that accumulating resources over time enables self-sustaining expansion, a concept still relevant for small businesses today.

Another entrepreneur emphasized asset accumulation:
"It rests on its own wealth by having assets and funding."
Asset ownership, such as real estate or intellectual property, provides financial security and passive income. Barney (1991) highlights that businesses with unique, valuable resources (VRIO framework) gain a competitive edge. Muharam (2018) argues that financial sustainability depends on balancing equity and operational funding.

One participant noted, "The value of what I do is sourcing and curating pieces… There is the jewellery that has value in itself," emphasizing value creation through exclusivity. Porter (1985) suggests that differentiation through unique products provides a competitive advantage. Kotler and Keller (2012) further argue that brand positioning shapes customer perceptions, especially in markets where uniqueness drives demand.

4.6 Cultivating ethical leadership in a design start-up

The responses from the entrepreneurs demonstrate a deep understanding of ethical leadership, particularly in the context of design entrepreneurship and small businesses. Several core themes emerge from their reflections. One participant highlights the importance of balancing profit with social responsibility, underscoring that ethical leadership should not only drive financial success but also ensure the business upholds sustainable and fair practices. This perspective aligns with the growing emphasis on responsible entrepreneurship that promotes long-term sustainability and fairness (Jones, 2010). Another entrepreneur emphasised the necessity of aligning business values with ethical principles, suggesting that integrity should be embedded in decision-making processes. This reflects the view that ethical leadership requires businesses to act in accordance with moral principles (Ciulla, 2004).

> “I mean fairness in your dealing with people and your employees goes a long way and gets you a lot of respect and it is amazing the difference I've seen in working with people that respect you. Because I really have always tried to”

Fostering a culture of mutual respect enhances workplace relationships and overall business effectiveness. This aligns with research indicating that ethical leadership creates a positive organizational culture that improves employee morale and productivity (Brown & Treviño, 2006).
Jewellery practitioners, potentially faces ethical dilemmas related to the sourcing of materials, and the participants expressed a preference for supporting local and smaller-scale suppliers to mitigate these concerns. This aligns with research suggesting that ethical leaders prioritize responsible sourcing and transparency in supply chains (Crane et al., 2016).
In sum, design entrepreneurs view ethical leadership as a multifaceted concept, encompassing social responsibility, fairness, respect, and sustainable practices in all aspects of business. While some provide clear, structured definitions of ethical leadership, others offer insights based on individual experiences This resonates with theories of servant leadership, which emphasize putting others' needs first and promoting fairness in leadership behaviour (Jamrich & Greenleaf, 1977).
While many entrepreneurs acknowledge the importance of ethical leadership, their ability to practice it effectively depends on the resources available to them and their business context. The responses indicate that ethical leadership is a key value, but practical barriers and the need for profitability can complicate its implementation. However, design entrepreneurs hold ethics on a high regard. For instance, one design entrepreneur had this to say:

> " I guess ethical leadership... Especially like a small-scale sort of approach. It's to do the right thing in every aspect as possible" (Participant D)
>
> "Being trustworthy when dealing with the clients " (Participant F)
>
> "to inspire and cultivate peers and client " (Participant G)

Based on the participant's responses, it is evident that design entrepreneurs understand ethical leadership from their own context. What stood out the most was that entrepreneurs see ethical leadership as trustworthy when dealing with clients and being able to inspire and cultivate peers and customers to do what is morally right.

4.7 Subsistence priority:

Subsistence – profit is not the only driver, but a longer-term survival is prioritised to sustain an income or way of life. This may include Reinvestment, purchasing assets to future proof the business and livelihood. In this model ethics results in long term employment for employees or providing a consistent level of service for clients.
Valencia et al. (2021) identify four mindsets within the Design Mindset Theory (DMT) subprocess: the Artisan, the Configurator, the Opportunity Seeker, and the Design Leader. These mindsets demonstrate a progression from effectual (means-oriented) to causal (goal-oriented) logic. Interestingly, the study finds that designers starting with the Artisan mindset were not always driven by a user-centric approach, instead prioritizing their own interests, beliefs, and venture goals. This contradicts succession planning which speaks to ethical leadership as it ensures passing of institutional knowledge and supports long term sustainability.

4.8 Cultivating succession planning in a design start-up

Succession planning speaks to ethical leadership as it ensures passing on of institutional knowledge and supporting long term sustainability and much needed job creation.
One entrepreneur emphasizes the importance of long-term sustainability through asset acquisition and ownership, especially in terms of land and infrastructure, an approach supported by Venkataraman (1997) and Barney (1991), who suggests that entrepreneurs who focus on owning critical assets often experience greater stability and control over their business.
The emphasis on leadership transitions and nurturing talent within the business also aligns with succession planning, which has been widely recognized as critical for maintaining business continuity. According to a study by Litz (1995), businesses that prioritize succession planning are better positioned for sustained success, as they avoid disruptions during leadership changes. In this case, the fashion entrepreneur's view that:

> "Succession planning is critical for ensuring business longevity. It involves identifying and naturing talent within the organization to ensure a smooth

> transition of leadership when needed."

Suggests a foresight that could help ensure the business thrives even after the current leadership transitions out of the business. In contrast, some entrepreneurs display a more reactive approach, where long-term sustainability and succession planning are not immediate priorities. One jewelry entrepreneur suggests that they have not yet considered succession planning for their business, which could indicate either a lack of awareness or the perception that long-term issues are secondary to establishing the business first:

> "I don't even know what that means. Explain to me..... that's something I should be interested in yeah."

This viewpoint is common in early-stage entrepreneurship, where the immediate need for income and visibility often takes precedence over long-term strategy (Shane, 2003). However, this reactive approach can be risky. Businesses without succession planning may struggle when the founding entrepreneur exists (DeTienne and Chirico, 2013). The jewelry entrepreneur's uncertainty about succession planning highlights a lack of strategic foresight.
Without proactive planning, businesses may face leadership gaps or market shifts. Gardner (2014) notes that failing to address succession early can lead to instability, directionless operations, and financial challenges. A lack of clear strategies for longevity can hinder scaling and navigating market disruptions.
Research shows that proactive strategies like succession planning and asset acquisition are essential for long-term success. Gallo and Vilaseca (1996) found that family-owned businesses with leadership transition plans are more sustainable. In contrast, businesses that delay succession planning may miss growth opportunities. As DeTienne and Chirico (2013) suggest, reactive planning can leave businesses vulnerable and hinder leadership development.

4.9 Enlightened self-interest:

According to Spence and Rutherford (2001), this frame includes motivations or actions that are socially based and will also positively impact the business. These owner-managers are not necessarily motivated by goodwill but employ goodwill and ethics as a form of marketing or public relations.

The findings indicate that design entrepreneurs clearly understand their target audience. However, the key question remains—are they reaching the right customers? For instance, one fashion entrepreneur identified their niche market as fashion enthusiasts aged 20 to 40, while another took a broader approach, stating that their target audience includes individuals aged 8 to 14 and those over 40 who are active on social media. Meanwhile, a jewelry designer described a more refined market, catering to affluent individuals, anthropologists, and seasoned collectors. A common theme among these design entrepreneurs was their reliance on social media as the primary platform for reaching their niche market.

A recent study by McKinsey and Company (2020) discovered that people between the

ages of twenty-five and forty are more likely to be fashion enthusiasts and this guides their purchasing their fashion garments. This statement supports the statement made by one fashion entrepreneur who said:

> "Our niche market focuses on sustainable fashion enthusiasts who prioritize and echo friendly materials and ethical production processes. We target individual or aged 25 to 40 who are conscious about their footprint on the marketing and. Seek unique, stylish yet sustainable clothing options. "(Participant B).

Niinimäki et al. (2020), in their Nature Reviews Earth & Environment publication, highlighted that sustainable fashion enthusiasts are mostly young individuals who rely heavily on social media, which aligns with the study's finding that all design entrepreneurs in the focus group use it as a primary platform for business growth. Kapferer and Bastien (2017) noted that niche markets thrive on social media due to entrepreneurs' personal brand involvement, particularly through storytelling and curated garments that reflect their values. Kim and Ko (2012) also argued that small businesses succeed on social media because they can implement tailored marketing strategies. However, some studies suggest social media alone isn't enough. White et al. (2019) found some customers prioritize sustainability over social media presence. Joy et al. (2012) added that small businesses with strong ethical values attract more affluent consumers. The findings show entrepreneurs do not see older individuals as fashion-conscious. However, ThredUp (2021) found older consumers are increasingly environmentally conscious and buy more sustainable fashion. Mintel (2022) also found individuals aged 40-50 favor sustainable fashion.
A challenge is the excessive cost of sustainable fashion, making it less affordable for younger consumers and potentially threatening the sector's long-term viability. Lundblad and Davies (2016) noted price can be a significant barrier for younger buyers. Therefore, small businesses must reconsider their market positioning and avoid overlooking a sustainability-conscious, ethical customer base. Despite the alignment with sustainable fashion, contradictions exist regarding the target age group and point of differentiation.

4.10 Unique selling point from a design entrepreneur's perspective

This study presents diverse perspectives on gaining a competitive advantage and establishing brand identity within the South African business landscape, particularly in the design sector. The findings and analysis are outlined below.
One fashion entrepreneur emphasized that their business stands out from competitors by sourcing and utilizing unique, high-quality fabrics. This suggests that fabric selection is the foundation of their unique selling proposition and business strategy. This aligns with Goworek (2010), who found that businesses sourcing premium-quality fabrics can distinguish themselves in the market. However, the South African fashion industry faces challenges due to an influx of low-quality fabric imports. Mkhize and Ellis (2020) further support this by arguing that businesses prioritizing premium fabric sourcing gain a strategic edge over competitors who do not.

> "When it comes to competitors, especially in South Africa, not to mention companies, but I mainly deal with fabric" (Participant B).

Sourcing high-quality fabrics is crucial, but businesses must also prioritize branding and their overall business model for profitability. Kapferer and Bastien (2017) argue that brand value and customer resonance are key to long-term success, even when premium materials enhance market prospects. The study shows South African design entrepreneurs focus on fabric quality but often neglect brand development, aligning with Porter (1985), who stresses the need for a comprehensive model to differentiate from competitors.

A common strategy among entrepreneurs is building strong business relationships, helping shape a positive brand perception. While many entrepreneurs reported strong customer relationships, some faced supplier challenges, such as production delays. Nonetheless, most described these relationships as positive, contributing to profitability. This aligns with Kotler and Keller (2016), who found that businesses prioritizing customer service achieve higher retention.

Despite the importance of customer service, small businesses must balance it with scalability and operational efficiency. Reeves and Deimler (2012) emphasize that sustaining long-term growth requires this balance. A key finding was that participants viewed artistic authenticity and unique designs as primary differentiators. Clark (2008) found customers prefer individualized designs over mass-produced styles. However, Hirschman (1986) argued that designs reflecting a designer's personal expression often struggle in the mainstream market, limiting their appeal and posing risks to brand sustainability (Solomon et al., 2018).

4.11 Social priority:

The "social priority" framework refers to a long-term lifestyle or business approach focused on values rather than maximizing profits. Social values and choices are embedded within the business operations. All participants mentioned maintaining strong relationships with their clients and suppliers, but none were involved in community engagement or social entrepreneurship. The consensus was that, as start-ups, they were neither financially nor logistically prepared to focus on these areas.

4.12 Community engagement in design start-ups: an entrepreneur's perspective

The study indicates that while design entrepreneurs are interested in community engagement, it is not an immediate priority, due to financial and mental readiness. As one entrepreneur noted:

> "For now, I haven't done any community engagement, but I have something that is playing on the pipeline."

This statement suggests that while entrepreneurs value community engagement, they are not yet financially positioned to pursue it. Many small businesses, particularly in the initial stages, prioritize profitability over social initiatives, focusing on financial stability before expanding corporate social responsibility efforts. Moorad et al., (2019) supports this, noting that small businesses typically emphasize financial growth initially rather than community-based projects. As a result, for many, community engagement is seen as a

luxury, not a necessity.

However, Harrison et. al. (2015) argues that financial constraints should not prevent small businesses from participating in social initiatives. He suggests that businesses can contribute to their communities in ways that do not heavily strain resources, fostering corporate social responsibility on a smaller scale. Kotler and Lee (2005) reinforce this, finding that such involvement can enhance a business's reputation and attract ethically conscious consumers, contributing to long-term success.

In summary, while financial stability is a primary concern for many design entrepreneurs, there is increasing recognition of the strategic benefits of social engagement. The challenge lies in balancing profitability with community involvement to support growth without compromising financial sustainability.

One jewellery entrepreneur expressed interest in collaborating with undergraduate students, envisioning a platform where aspiring designers could introduce concepts for commercialization. While eager to engage in community initiatives, these entrepreneurs focus more on future projects than immediate action.

This view aligns with Elinger et al., (2011), who emphasized that collaborations foster community engagement. Dahla (2015) also found that involving local communities in design concepts strengthens ties and empowers them. However, Moorad et al., (2019) argue that limited resources—time, money, and space—often constrain the feasibility of such engagement for design entrepreneurs, making it an impractical option for small businesses. This is reflected in the diagram below, where responses were mapped to the four frames, with none aligning with social priorities.

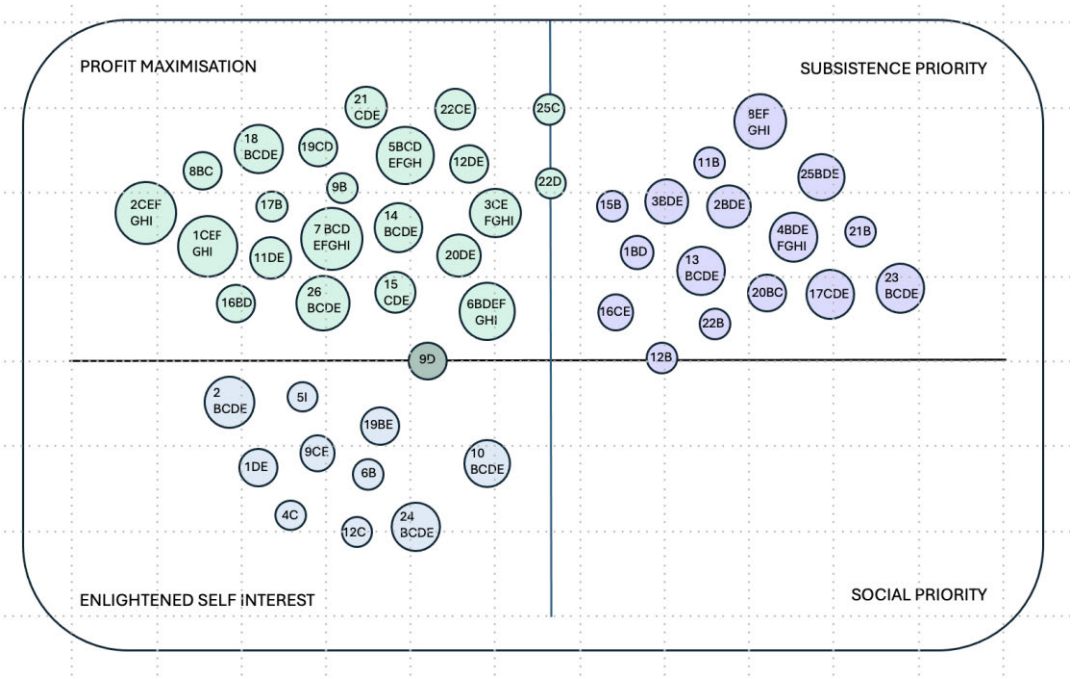

Figure 1. Alignment of participant responses with Spence and Rutherford's (2001) Four Frames.

5. Conclusion and recommendations

In conclusion, this study identifies two entrepreneurial paths: creative entrepreneurship driven by passion and innovation, and survival entrepreneurship motivated by financial necessity. While passion can spark business creation, it does not guarantee profitability, and necessity-driven entrepreneurs often struggle with growth. Design entrepreneurs, in particular, face challenges in integrating entrepreneurial strategies with their creative skills, impacting their success. The findings align with global literature.

South African design entrepreneurs view ethical leadership as encompassing social responsibility, fairness, respect, sustainability and being trustworthy when dealing with stakeholders and inspiring and cultivate peers to do what is always morally right. While some offer structured definitions, others base their insights on subjective experiences. Their ability to practice ethical leadership depends on available resources and business context.

The study underscores the importance of business education in design qualifications, especially in South Africa, where market access and scalability are limited. Profitability is possible but requires strategic planning, economic management, and adaptability.

The research also emphasizes proactive succession planning as crucial for long-term stability and local job creation. It suggests that socially driven entrepreneurship could offer profitable alternatives to a survivalist mindset.

Recommendations for further research to design education, and entrepreneurial practice and policy:

- The development of context relevant pedagogical models that integrate hands-on business simulations to equip graduate designers with ethical entrepreneurial and leadership skills.
- Incorporating business simulation and entrepreneurship into the design-business studies curriculum:
- Policies and government initiatives that support social entrepreneurship as economically viable alternatives for (design) start-ups.
- Alternative models for the incubation of ethical design leadership amongst South African design start-ups.

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Cultural Heritage and Ethical Design: A Sustainable Approach to the Revival and Innovation of Guangzhou Embroidery

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Yue embroidery is considered to be one of the four major traditional embroidery techniques in China, and is recognised as one of the 'Four Famous Embroideries' in China, alongside Guangzhou embroidery and Chaoshan embroidery. This research project explores the potential for the sustainable development of traditional Guangdong handicrafts through the implementation of ethical design and design leadership principles. It also examines the interactive relationship between traditional craftsmanship and modern design innovation.
The study proposes a cultural innovation framework that emphasises ethical leadership, incorporating design engagement, collaborative innovation, sustainable incubation and dissemination strategies. The objective of this framework is to facilitate the effective integration of Cantonese embroidery with contemporary market demands, while preserving its cultural authenticity. A mixed-methods approach was adopted to explore the coordination of Cantonese embroidery in the contemporary design industry in depth and identify key strategies for its industrial creativity. The results demonstrate that ethical leadership is crucial for balancing cultural authenticity and commercial viability, protecting the integrity of intangible cultural heritage and promoting sustainable design innovation. This study not only identifies key innovation strategies, but also provides a new perspective on craft-based design-driven entrepreneurship that contributes to the protection and sustainable development of global cultural heritage.
Keywords: Guangzhou embroidery, inheritance, cultural sustainability, design leadership, ethical design, design-driven entrepreneurship

Research Objectives

Cultural Analysis: This component of the study will entail an exploration of the historical and cultural significance of Guangzhou Embroidery within the context of China's intangible heritage, with a focus on the principal characteristics of this traditional craft.
Ethical Design Framework: The development of a model of design leadership is imperative in this section, with the transmission of Guangzhou Embroidery prioritising cultural authenticity and the creation of ethical values.
Collaborative Innovation and Sustainable Cultivation: The identification of mechanisms for cooperation among multiple stakeholders (artisans, designers, policymakers) to sustain handicraft practices is a key element of this component.
Sustainable Growth: Propose strategies to avoid excessive commercialisation while enhancing market vitality through design-driven entrepreneurship.

Methodology and Tools

Mixed Methods Approach
Field Research: Conduct semi-structured interviews and site visits with multiple Guangzhou Embroidery intangible heritage masters, designers, and cultural heritage researchers in Guangdong Province (2023-2025).

Case Study (Wang Xinyuan Model): Investigate the complete design and production supply chain of the Wang Xinyuan brand in Guangzhou Embroidery.

Stakeholder Analysis: The roles of government, non-governmental organisations, and businesses in cultural preservation will be mapped out.Design Thinking Workshops: The development of prototypes of modern products rooted in cultural heri-

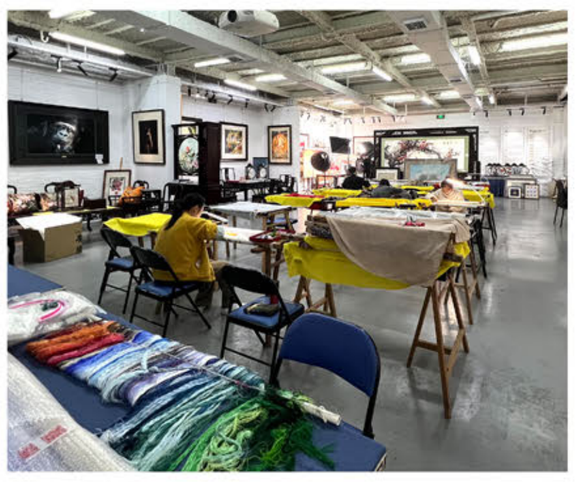

Figure 1: Wang Xinyuan's Guangzhou Embroidery Master Studio

Figure 2: Wang Xinyuan's Guangzhou Embroidery Master Studio Live Broadcast

Table 1
Key Aspects of Guangzhou Embroidery's Preservation Pathways

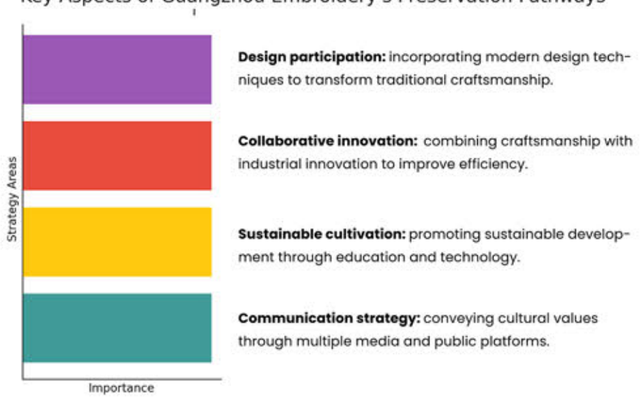

Table 2
Design Leadership and Ethical Design Practice – A Case Study of Wang Xinyuan's Guangzhou Embroidery Master Studio

Dimension	Category	Specific Strategies and Practices
Heritage & Innovation	Core Philosophy	Responsibility for intangible heritage preservation ("Choose one thing for life"), brand commercialization/industrialization integration, innovative industrial development and heritage fusion.
	Heritage System	"One Museum – One Brand": Wang Xinyuan Guangzhou Embroidery Master Studio (Teaching and Demonstration), Cluster Gathering (Commercialized Operation), Wang Xinyuan Embroidery Research Institute (Online Transmission & Public Education).
Talent Cultivation Model	Teaching	Online live-streaming public education, online vocational training (including military veterans), university research collaborations.
	Apprenticeship & Collaboration	Cooperation with 43 vocational schools, collaboration with 200 rural embroiderers for customized orders, structured training for over 100 vocational students.
Product Development	Handicraft Ethics	Purely handmade production, non-industrialized manufacturing (ensuring craft integrity), analysis and innovation of Guangzhou Embroidery (modernized techniques) and traditional embroidery teaching.
	Product Segmentation	High-end customization (collectible embroidery products), daily-use consumer goods (silk scarves, hats, brooches, and other lifestyle-integrated designs).
Business Development	Sales Network	Physical store sales, foreign trade exports, exploration of youth-oriented e-commerce channels.
	Brand Strategy	Cultural IP creation (historical revitalization), cross-sector collaborations, "Guangzhou Embroidery+" scene-based applications (furniture, fashion, cultural and creative products).
Social Impact	Cultural Promotion	High-tech heritage process construction, community-based experience workshops, international cultural exchange projects.
	Economic Empowerment	Rural women's employment revitalization, traditional craft modern transition demonstration projects, veteran re-employment.
Ethical Design Practice	Sustainability	Income and livelihood security plans for artisans, standardization of traditional and innovative embroidery techniques.
	Youth Training	Establishing university embroidery societies, "New Guang Embroidery Revival Plan," digital heritage documentation.

Research Process

The present study follows a four-phase research process to thoroughly examine the modern revival of Guangzhou Embroidery.

Phase One: Historical and Cultural ContextualizationReview of Guangzhou Embroidery archives, museum collections, and scholarly research.Understanding of how Guangzhou Embroidery has evolved over time.

Phase Two: Contemporary Challenges and Industry InsightsIdentification of current limitations, including the decline in artisans and market challenges.Conduct of interviews with industry experts to assess real-world applications.

Phase Three: Ethical Entrepreneurship Case Study – Wang Xinyuan Guangzhou Embroidery-

Obtained Results

1 Cultural & Market Integration: The research successfully demonstrated how ethical leadership and design innovation balance the preservation of Guangzhou Embroidery's cultural authenticity with contemporary market demands.

2 Ethical Design Leadership: Emphasised the importance of ethical leadership in the sustainable development of traditional crafts, creating a complete design-production chain that increases employment while balancing cultural protection and commercial viability.

3 Sustainable Innovation & Stakeholder Collaboration: Through collaboration among artisans, designers, policymakers, and entrepreneurs, the study showed how a multi-stakeholder model, with active participation from educational and cultural institutions, can sustain and expand the Guangzhou Embroidery industry.

4 Cultural & Economic Impact: Highlighted the potential of creative industries to empower local communities economically, with positive effects on rural women, veterans, and other groups. It also demonstrated how intangible cultural heritage can promote the development of local tourism.

5 Craft Entrepreneurship Framework: Provided a novel perspective on design-driven entrepreneurship in the craft industry, offering a practical framework for the adaptation and development of other traditional crafts in the modern economy.

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DESIGN AS A TOOL FOR CHANGING THE IMAGERY UNDERLYING LEADERSHIP.

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ABSTRACT | Contemporary power is largely based on economic structures, in which financial groups such as BlackRock, Vanguard, State Street, JPMorgan, Microsoft, Berkshire Hathaway and Tesla affect global policies on the economy, energy and consumption patterns (Monico, 2023). These groups, through a network of influential brands, exercise a leadership that shapes not only the economy but also culture and the collective imaginary. Their hegemony is embodied in *Brand Values*, which, through sophisticated design and branding strategies, drive consumption and influence public choice (Grizzanti, 2011). However, recent 'brand activism' is directing the energy of branding towards broader goals, such as sustainability and social responsibility (Kotler, Sarkar, 2021). Tippe Top Design, an innovative approach introduced in 2021 and employed at ISIA Roma Design, promotes a turnaround in the values and imagery of design, moving towards consumption patterns that reduce environmental impact (Damiano, Datti, Monico 2021). This approach, of a democratic speculative decoupling design method, together with art as a tool for change, can create new values that contribute to a sustainable global transformation (Pistoletto, 2023).

KEYWORDS | ECONOMIC POWER, BRAND ACTIVISM, BRAND DESIGN, TIPPE TOP DESIGN, ART & DESIGN

X-Format

Contemporary power is largely based on economic structures, where financial giants like BlackRock, Vanguard, State Street, and JPMorgan shape global policies on the economy, energy, and consumption (Monico, 2023). Through extensive brand networks, they influence both the economy and collective imagination. Their hegemony manifests in 'brand values,' which, through strategic branding, shape consumption and public choices (Grizzanti, 2011).

To enact real change, particularly in the face of the climate crisis, we must rethink consumption. Knowledge fosters awareness, but change requires intention, rooted in desire. To alter global markets, we must reshape collective desires. Since desires are influenced by imagery, transforming the 'imagery of progress' is key to creating lasting change.

We live in an era of crises: climate, geopolitics, and beyond. In times of uncertainty, people seek reassurance. But if "God is dead" what fills the existential void? The answer often lies in consumption: purchasing products to construct identity and role. Brands, as the driving forces of economic logic, wield immense power through sophisticated brand design techniques. "Our mental imagery is presided by brands" (Grizzanti, 2011). However, a shift is emerging through 'brand activism,' which channels branding towards sustainability and social responsibility (Kotler, 2021).

"Tippe Top Design", a methodology of Systemic Design introduced in 2021 and employed in both education and design at Author's Affiliation, promotes a shift towards environmentally responsible consumption patterns (Damiano, Datti, Monico, 2021). The climate crisis is fueled by consumption models, making design a critical discipline, shaping the very processes that sustain this economic system.

Designers interpreting collective imagery, determine the brand values and align products and communication campaigns to them (Datti, Rullo, 2021). The power and seduction of brands cannot be easily replaced, so consumption patterns must be reimagined using large-scale branding logic. A viable global strategy is to evolve brand values, positioning them as guiding coordinates. This would trigger a viral, financially powerful transformation, steering collective imagery toward more sustainable choices. Some brands have already begun this shift through 'Brand Activism,' including Patagonia, Rolex, and Montura.

But how can brand values be altered to spark meaningful change? Brand design, bound by economic forces, is insufficient alone: we need Art! The 20th-century imagery is obsolete for the 21st century; we require an artistic perspective that challenges existing paradigms. Artists adopt divergent viewpoints, stepping outside the conditions that created problems to envision new solutions. Art, as a method of deconstructing and reconstructing imaginaries, uncovers hidden futures. Its freedom allows it to reshape values, catalyzing global change.

Artist Michelangelo Pistoletto, with works like Venus of Rags and the "Cittadellarte" project, sees Art as a means to "inspire and produce responsible societal change." This speculative design approach, where art serves as a transformative tool, has the potential to generate new values and drive sustainable global shifts (Pistoletto, 2023).

Now more than ever, Art and Design must work together to drive change. While they operate at different cognitive, human, and social levels, their synergy is essential for reshaping our future.

The experiment that we intend to hold is inspired on the “exquisite corpse” method. The Distant Early Warning (DEW) card deck is not a traditional game with rigid rules or correct answers, but a real tool for intellectual and creative exploration. Its purpose is to stimulate intuitions, questions and reflections on society, communication, technology and cultural change. The important thing is therefore the questioning, the asking of open questions, stimulating attention towards future changes in society and culture.

The DEW Line Card Deck: Instructions for Use within the Tippe Top Design Framework

Inspired by Ezra Pound’s evocative notion of the artist as "antenna" and Marshall McLuhan’s elaboration of the *Distant Early Warning* (DEW) system—a metaphor drawn from Cold War radar technologies—the DEW Line Card Deck serves as a speculative and anticipatory instrument within the Tippe Top Design (TTD) methodology.

In McLuhan’s vision, the DEW Line was a metaphor for art’s capacity to detect subtle shifts in cultural sensibility before they erupt into overt social transformations. This card deck operates in that same spirit: as a cognitive radar system, enabling designers, educators, and thinkers to perceive the faint tremors of paradigm change before they reach the surface of mainstream discourse.

Instructions for Use:

1. **Activation through Chance**
   Each participant is invited to draw a card at random from the TTP Card Deck. Each card bears a Tippe Top Design’s referred concepts that are deliberately open-ended, generative, and speculative in nature.
2. **Written Response and Reflection**
   Upon receiving their card, participants are asked to compose a brief reflection. This response may take the form of a statement, question, hypothesis, or intuitive insight related to the drawn concept, forming a first layer of interpretation—what we might intend as a “probe” into emerging patterns.
3. **Collective Resonance and Amplification**
   The facilitators, Datti & Monico, will then extract a selection of these written responses, contingent on time constraints, and read them aloud to the gathered audience. These moments will serve as micro-dialogues—occasions for short shared reflection, interpretative blast divergence, and associative thinking. The audience becomes co-sensorial, forming a human feedback loop.

All collected responses will be systematically compiled and analysed by the Tippe Top Design facilitators. Rather than seeking consensus, the goal is to map the aesthetic, cognitive, and methodological terrain revealed through the exercise. These responses constitute an initial corpus for a broader investigation into the epistemic and pedagogical dimensions of the TTD method.

Ultimately, the cumulative findings of this experimental process will inform both future iterations of the DEW Line exercise and scholarly reflection, forming the basis for potential publication and methodological refinement.

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DESIGN-BASED CREATIVITY IN GEOGRAPHY: A MODEL FOR TRANSFORMATIVE LEARNING.

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ABSTRACT | Over the past three decades, geographers' interest in visual languages and creative methods has grown significantly (Hawkins, 2013; Von Benzon et al., 2021). While the role of art in these methodologies has been widely studied (Hawkins, 2015), the impact of designers' process-oriented creativity on the transformative learning of young geographers has received less attention. Unlike artists, designers channel creativity into functional outcomes by working within *constraints* (Patti, 2017).

This study explores how incorporating a design-based approach within a transformative learning framework (Brookfield, 2005; Cranton & Taylor, 2012) can foster ethical learning (Goralnik et al., 2012) and critical thinking (DeJaeghere, 2009; Cassim, 2018) among higher education students. The creative turn in qualitative research engages university geography students from multicultural backgrounds and employs educational tools developed by designers to activate creative design processes, guiding students toward tangible outcomes.

Preliminary findings suggest that this approach enriches course content, promotes ethical competencies, and encourages teamwork. It provides a valuable shift in perspective for students in the social sciences, preparing them to address complex issues with creativity and responsibility. This study has contributed to the formulation of a transformative learning model, which will undergo further testing and refinement in future workshops.

KEYWORDS | TRANSDISCIPLINARITY, TRANSFORMATIVE LEARNING, CRITICAL THINKING, CREATIVE METHODS, DESIGN-BASED CREATIVITY

1. Introduction: The Transformative Power of Transdisciplinary Education

Contemporary society is characterized by precariousness and uncertainty regarding the future, which Bauman (2013) described as the "epoch of disengagement." In this context, education aimed at building critical and radical consciousness becomes essential to go beyond disengagement and to involve people in the commitment to transform reality (Freire, 2011; bell hooks, 2003).

The efforts of numerous researchers and educators are currently focused on an education that fosters ethical practices, promotes social justice, and encourages responsible citizenship (Nagda et al., 2003). In this context, the transformative power of transdisciplinary education plays a crucial role, as it manifests through techniques that transcend the boundaries of traditional disciplines, integrating knowledge from diverse fields to create a more holistic and impactful learning experience. This approach enables students to develop critical thinking skills and address problem-solving in creative ways (Massari, 2021; Philipp & Schmohl, 2023). From this perspective, a transdisciplinary approach is crucial to respond to the complexity of contemporary times and to promote the democratization of research and educational practices (Burnard et al., 2022).

The transdisciplinary approach, as described by design education pioneer Aldo Calò (1978), embodies the essence of the designer and is increasingly reflected in design education's engagement with diverse disciplines, including the social sciences (Rowe, 2023). Likewise, anthropologists, ethnographers, sociologists, and geographers have incorporated creative practices into education and research (Giorgi et al., 2021) and also claim for the need of integrating different actors (professionals, the civil society, etc.) in knowledge co-creation. The objective of this paper is to investigate the potential application of design in the context of university-level education, with specific reference to those fields who are interested in digging into space and place dynamics.

In the past thirty years, geographers' growing interest in creative methods has enabled them to engage with knowledge in more dynamic and comprehensive ways (Hawkins, 2015; Von Benzon et al., 2021; Bourlessas & Puttilli, 2024). However, to avoid a superficial or naive application of creativity, careful consideration and critical reflection are essential, as without it, the creative turn in geography risks becoming merely a trend (Hawkins, 2019). Thus, involving creativity professionals is crucial for collaboratively developing critical and participatory processes that foster creative sensibilities and skills in all participants.

While the role of art in these creative methodologies has been widely explored (Hawkins, 2013; Leavy, 2015.), the role of design has received less attention. Unlike artists, designers channel inventive toward functional outcomes, working within *constraints* (Patti, 2017). Sarkar and Chakrabarti (2008), after analyzing over 160 definitions of the term *creativity*, proposed the following definition: "Creativity occurs through a process by which an agent uses its ability to generate ideas, solutions or products that are novel and valuable." Although both forms of creativity share an element of novelty, artistic creativity is more oriented toward a moment of free expression, while design creativity draws its driving force from the constraint, which also integrates logical processes (Patti, 2017).

How, then, can the creative approach typical of design be integrated into geographic education to make a significant contribution to an education that promotes collaborative

skills, ethical leadership, critical thinking, and conscious citizenship? The following text frames the theoretical framework through which a project-based and place-based transformative learning model, incorporating design methodology, has been proposed. This model was developed through the experience of three different workshops with international students enrolled in geography courses.

2. Critical Learning through Experiential Design Practices

Mezirow (2008) suggests that we uncritically absorb values and beliefs from our social and cultural milieux, adopting the dominant ideology as the norm. Transformative learning begins when we recognize these beliefs as oppressive and consider alternative perspectives, challenging previously unexamined views (Cranton & Taylor, 2012). This process involves both individual and social transformation, with critical theory playing a key role in fostering social change (Brookfield, 2005).

The learning moment is crucial for developing awareness and critical thinking (Freire, 2011; Elwood, 2004). University courses that adopt a critical approach through experiential practices are able to connect theoretical learning in the classroom with experiences from the *real world* (Kolb & Kolb, 2017). This type of approach is increasingly recognized for its capacity to stimulate critical analysis of social inequalities while simultaneously promoting responsible citizenship (DeJaeghere, 2009; Cassim, 2018).

In the context of transformative learning and the application of critical theory, design assumes a *doing* dimension capable of bringing theory and reflection *into action* (Swann, 2002). Design can be seen as a concrete process that integrates reflection and action to transform reality through critical analysis. Critical Design, in particular, is a research practice that emphasizes the ethical positioning of the designer, aiming to stimulate reflection, raise awareness, and challenge assumptions, while encouraging actions through democratically participatory practices (Dunne & Raby, 2007; Bardzell & Bardzell, 2013). The proposal is to apply critical and participatory design processes in educational contexts.

Writing from a designers' perspective and discussing large-scale social transformations, Manzini and Rizzo (2011) describe participatory design as "a constellation of design initiatives aiming at the construction of socio-material assemblies where open and participatory processes can take place." In this framework, the concept of the *design device* is central, as they are artifacts specifically designed to initiate conversations and inspire a series of meaningful actions. Graphic resources or visual elements are *cognitive artifacts* that can be used in collaborative research spaces to facilitate teamwork, promote collective reflection, support the creation of shared knowledge, and strategically organize actions within a specific educational context. These tools are described as *Devices for Thinking the Common* (Iconoclasistas, 2021) or *feelthink* machines (Iconoclasistas, 2022), drawing on the *sentipensante* approach coined by Orlando Fals Borda, which emphasizes "thinking with the heart and feeling with the mind" (Fals Borda, 1979).

The designer, in the development of these transformative learning processes, can therefore assume the roles of 1) *trigger*, designing design devices or *feelthink* machines; 2) *facilitator*, supporting discovery, learning, and co-design processes; 3) *design activist*, proposing socially relevant design initiatives (Manzini & Rizzo, 2011). Additionally, the designer can play the role of *visual literacy educator*, introducing new practices and skills

(Hawkins, 2019), particularly with regard to the interpretation and understanding of visual communication. Visual form, in fact, represents a mode of knowledge through which some ideas are expressed more powerfully than through other languages. Like verbal form, visual language requires education and practice (Swann, 2002). Finally, the practical dimension, capable of bridging theory with action to solve real-world problems, can be guided by the designer through the creative and design process.

To leverage the transformative potential of design in higher education, it is essential to address real-world problems through both place-based and project-based approaches. In geography, place-based education (PBE) emphasizes community-centered, contextualized learning, fostering civic identity and community connections (Simm & Marvell, 2015; Schild, 2016; Yemini et al., 2023). Furthermore, place-based experiential approaches, , which facilitate learning that engages both emotional and intellectual experiences, help cultivate a sense of responsibility in tackling problems by fostering an ethic of care (Goralnik et al., 2012). Project-based learning (PBL), which encourages practical and collaborative problem-solving, is particularly valuable for developing transversal skills (Kokotsaki et al., 2016; Guo et al., 2020). Moreover, case studies in urban geography highlight how experiential learning can promote critical reflection, enabling students to engage actively and critically with urban spaces and their meanings (Elwood, 2004; Yemini et al., 2023; Bourlessas & Puttilli, 2024).

3. Case Studies: Educational Experiments in Academic Geography Courses

All of the workshops described below were developed in collaboration with faculty members, researchers, and PhD students from the University of Padua as part of the two-year international Master's programme in Local Development. The programme is a practitioner-oriented curriculum and strongly rooted in the social sciences. All the courses are taught in English, and the student group is overall multicultural and socially diverse, both in terms of social class, ethnicity, gender, sexuality, and disability.

The workshops were conducted as an integral component of two different course units within the same masters: the first, *Geographical Space: Concepts, Tools, and Practices,* adopts critical approaches to the concept of development, challenging Western epistemologies, while the second *Social and Political Tourism Geographies*, provides a broad critical understanding of tourism, privileging a qualitative embodied and emplaced perspective. The inclusion of these activities within the course units was shaped to encourage students to adopt a critical approach to social research (Pepa et al., 2024), enabling them to comprehend abstract concepts by grounding them in the everyday experiences of participants and the places they inhabit. The idea of practical activities within a course is also linked to previous experiences that revealed the students' need to learn to think critically, on one hand, and express a sense of powerlessness in the face of global injustice, on the other hand (Caretta & Pepa, 2023).

3.1 Case Study A – Counter-Cartography Workshop

The first workshop, held over four two-hour sessions between November and December 2023 as part of the *Geographical Space: Concepts, Tools, and Practices* course unit. While

the course unit had a specific instructure among the faculty members, the workshop was led by the kollektiv orangotango, a collective that specialises in collective mapping and counter-mapping and that was invited specifically on this occasion. The workshop included an introductory session followed by three in-class feedback sessions. Students were divided into four groups of 8-10 people and tasked with continuing the mapping process between sessions. Each group was assigned a theme to develop a counter-map, focusing on topics such as housing conditions, decolonial traces, and gender/care issues. Given the limited time frame and the importance of a situated perspective, students were encouraged to map these themes from a personal viewpoint, using their own experiences as the primary data source. The workshop concluded with a feedback session, where the students presented their work to the class, with members of local collectives engaged in the explored topics in attendance (Pepa et al., 2024).

3.2 Case Study B – Bridging Theory and Practice in Critical Tourism Geographies Learning

The second workshop took place over three sessions, each two- hours long, between April and May 2024, as part of the *Social and Political Tourism Geographies* course unit. On the first meeting, the main instructur, who had already lectured traditionally for a few weeks, introduced the designer and the ongoing activity to be taken together; this first meeting was followed by three feedback sessions ending with a *guided tour* in the historical city centre of Venice; the guided tour was organised by the students, with their colleagues and the instructors as an audience. To prepare this final, open air assignment, students were divided into six groups of four people, and were tasked with creating a tour that instead of showing the beauties of Venice, would have shown the problems connected with tourism. If tourism is about learning about a place, here students-cum-tourists would have planned a tour to learn about tourism. To come to this end, students had to choose a topic, explore how it was spatialised and emplaced in Venice, moving from a map that was given at their disposal to its enactment in the city of Venice itself. Students were provided not only with a map (Fig. 1) but also with a booklet titled *Urban Layer Handbook. Design Devices for Field Research. Investigate Geographies of Tourism Bridging Theory and Practice,* a cognitive object created by the designer involved in the course unit to help them interpret the city through different layers (inhabited city, productive city, public city, leisure city…). The experience concluded with a feedback day in Venice, during which the students performed the tours they had designed.

Figure 1. Photo taken during a review session in the *workshop Investigating Geographies of Tourism: Bridging Theory and Practice*.

3.3 Case Study C – Mapping Rione Palestro Workshop

The third workshop took place over four sessions, including two four-hour sessions and two two-hour sessions, totaling 12 hours, between November and December 2024, again as part of the *Geographical Space: Concepts, Tools, and Practices* course. This second edition of the counter-mapping workshop was developed in synergy with the collective *Decolonize Your Eyes*, active in the multicultural Palestro neighborhood. Students were divided into four main thematic groups: history of the neighborhood, the neighborhood today, the neighborhood of the future, and the toponymy of the neighborhood. Each thematic group was divided into one subgroup tasked with creating a word map and another tasked with creating a visual map, resulting in eight groups of around five students each.

As with the previous workshops, this workshop was introduced through exercises and a theoretical lesson by kollektiv orangotango. The designer provided a theoretical introduction to visual language management and supplied students with visual design devices to assist them in the design of their research experience, information selection, and visual mapping (Fig. 2). Following the introductory session, three review sessions were conducted, and students organized themselves to continue the mapping between sessions. The workshop concluded with the presentation of the maps and of the mapping process to the rest of the class.

Figure 2. Students using one of the design devices developed for the workshop *Mapping Rione Palestro*.

4. Learning Model: Proposal for a Transformative Learning Model

From these experiences, a place-based and project-based transformative learning model emerges, realized through a design approach dedicated to the design experience itself. This model consists of the following interconnected phases in an iterative process:

1. **Theoretical Exploration** – Exploring the theory and introducing the topics to be addressed, this phase also incorporates marginalized knowledge, with the professor playing a crucial role.
2. **Generating Shared Knowledge** – Discussing the proposed topic with the workgroup promotes self-awareness and mutual understanding, particularly in intercultural contexts.
3. **Co-design** – The participatory design of an artifact, experience, or service that conveys a counter-narrative of space from a critical perspective. In this phase, the designer plays a key role in facilitating this process.
4. **Connecting with the Place** – Conducting research to gather information and establish relationships within urban spaces. Individuals who navigate or inhabit

these spaces (e.g., local communities, collectives, tourists) act as interlocutors and potential beneficiaries of the project.

5. **Sharing** – The presentation and testing of the design device with the rest of the class, as well as with the local or academic community.

This model involves two types of design devices (Manzini & Rizzo, 2011; Iconoclasistas, 2022): those created by the designer as tools for conversation and those developed by student non-designers as enablers of the experience. The design devices created by the designer, as tools for conversation, are intended to help geography students (non-designers) adopt a design methodology within the group. The second type of design devices, which are conceived as enablers of the experience, represent the project outcomes developed by the student non-designers.

4.1 Analysis and Student Feedback for the Construction of a Transformative Learning Model

The development of this model was made possible through the feedback provided by students who participated in the workshops. Students were asked to provide feedback on the workshops via a questionnaire in case studies A and B, and through both a questionnaire and individual autoethnography (texts, drawings, photos, etc.) for case study C. What emerges from the analysis of the feedback is that, despite initial difficulties with group work, students appreciated the experience and recognized its value, particularly within the multicultural context. Many students from workshops B and C noted that the experience allowed them to apply theoretical concepts practically. One student found the workshop transformative, describing it as the missing piece to overcome feelings of frustration and powerlessness. Additionally, encouraging critical engagement with places proved highly effective, helping students shift their perspectives, connect with the studied locations, and move beyond stereotypes. One student highlighted how the project made them realize that social and political issues are often global in nature, motivating them to foster change and contribute to a more just and humane future.

Nevertheless, each workshop allowed for the improvement of the five phases outlined in the model. Infact, the first workshop revealed chaotic design processes and poorly communicative visual maps. This highlighted the importance of providing students with a clear brief, design constraints, and visual tools to guide them through the creative process, thereby enhancing their skills and ensuring that the design outcomes function as devices that enable the experience. In the second workshop, the introduction of the booklets was a first attempt in this direction. Although some students described the booklet as "very useful to shape the imaginary and reality of a place" or "very helpful not only to help us think about our topic but also to build our own itinerary for touring," its use remained individual, not collective, and it did not fully serve its role as a diary or exploration notebook.

The revised management of the educational structure in the third workshop enabled a more effective design of the five phases of the learning model, particularly with regard to phases 2, 3, and 4. Specifically, design devices were developed to support phase 2 (generating shared knowledge) and phase 3 (co-design). Crucial to the implementation of the co-design phase was the focus on collective mapping methodologies, facilitated by the intervention of the kollektiv orangotango, as well as the facilitation of design

processes (Manzini & Rizzo, 2011) and the development of visual language skills (Swann, 2002) by the designer. Furthermore, it emerges as highly important in phase 3 to give a clear objective and a defined user group to direct the design of the device developed by the students. Finally, phase 4 (connecting with the place) was particularly effective due to the involvement of strategic actors, such as the inhabitant and the Decolonize Your Eyes collective, which plays a politically and socially activating role in the area. These factors have resulted in student's outcames more complex, featuring a more coherent language and a deeper critical reading of the place under examination. (Fig. 3). Visual language acted as an enhancer of the information collected during the research phase and the critical vision presented by the group. One student reported: "Choosing colors, text sizes, and placements became an act of storytelling, where design choices shaped how other people would perceive and interact with the map."

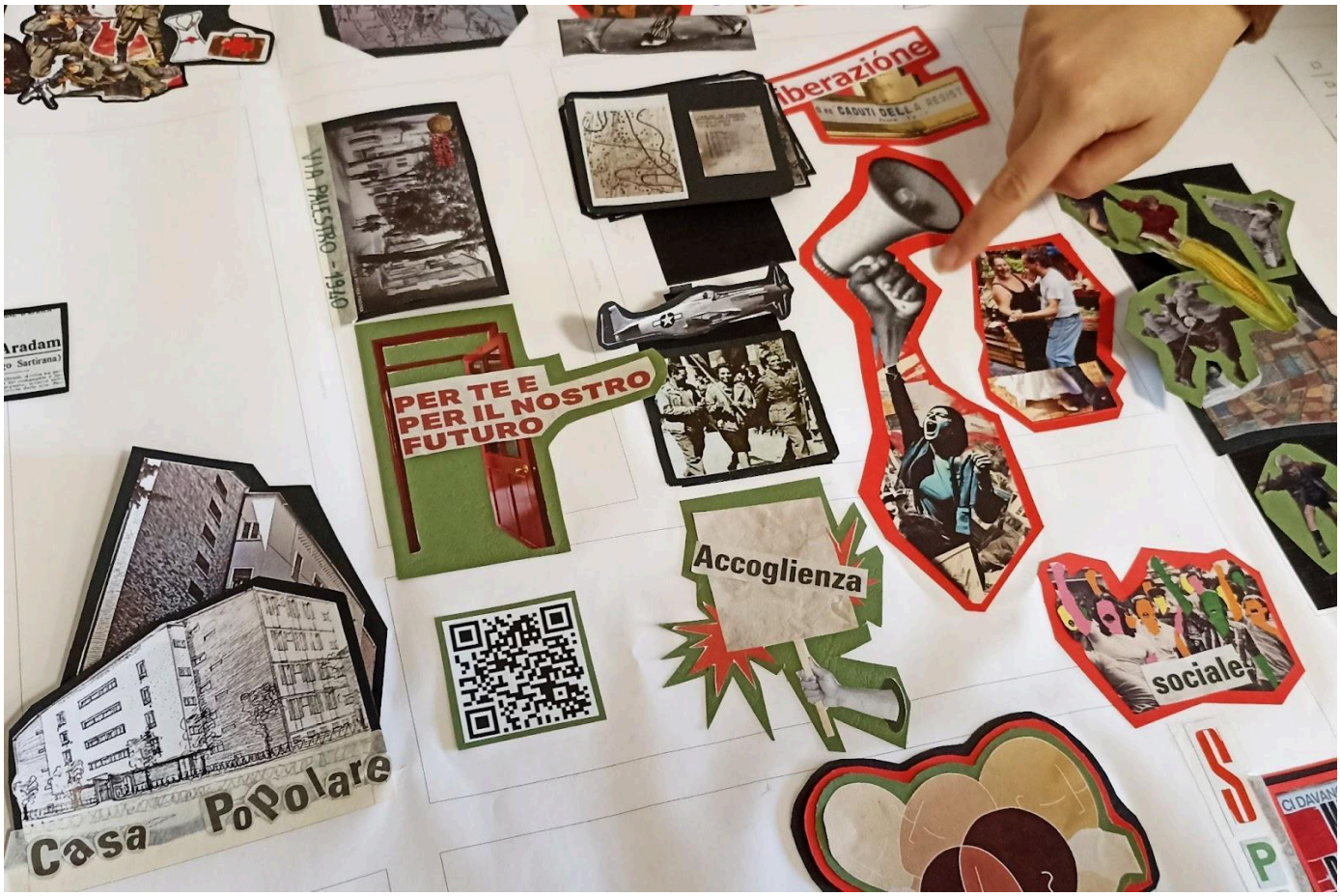

Figure 3. Visual map in progress developed by a group of students during the workshop *Mapping Rione Palestro*.

In conclusion, through research and design, students engage in a place-based and project-based learning process, collaborating to achieve goals through the sharing of knowledge and insights. Transdisciplinary learning is realized not only by involving specific methodologies from diverse disciplines (design, social sciences, geography), but also by integrating practices, collaboration, and knowledge from a wide range of stakeholders (local residents, activists, local and international students, academics) (Massari, 2021; Philipp & Schmohl, 2023). The self-management aspect and the challenges associated with conceptualizing and realizing projects further enhance student engagement, driven by cognitive, emotional, and ethical elements (Goralnik et al., 2012; Kokotsaki et al., 2016). Moreover, the transformative dimension emerges through the critical perspective shift experienced by many students (Cranton & Taylor, 2012),

facilitated by the practice of group work and the analysis of topics related to the places explored.

5. Conclusions

The transdisciplinary approach to education, integrating design, effectively addresses contemporary educational and social challenges by fostering critical, collaborative, and creative skills. The workshops in this study show that using design as a teaching methodology, alongside project-based and place-based learning, enhances student engagement and stimulates critical reflection on global and local issues. The design devices developed by both instructors and students facilitated an educational process that promoted critical thinking and practical skills through hands-on, collaborative design.

These experiences demonstrated how design, especially critical and participatory design, can transform students' connections to places and communities. The combination of theory, practice, and visual tools encouraged new perspectives on these places. Collective design and experiential learning strengthened students' collaboration, sense of belonging, and civic responsibility.

This emerging learning model suggests that design can catalyze transdisciplinary, transformative education, applicable not only to geography but also other fields, including design. The model will continue to be refined in future workshops, aiming to foster informed, responsible citizens who can address future challenges with ethical and creative solutions.

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Design-led waste management: enhancing stakeholders information exchange for circular productions

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ABSTRACT | To enable sustainable future production systems, waste management is a crucial issue, and designers may assume the role of leadership by negotiating proper material use among various stakeholders that allows resources to be reintegrated into life cycles and establishing new production hierarchies that prioritize waste prevention and capitalize on market opportunities. The presented research investigates ways of stimulating circular material use in the furniture industry, where a transformation has already started, in part due to economic interests and shifting consumer sensibility, but mostly due to a regulatory push towards more sustainable solutions, especially in case of public procurements. While designers have long been experimenting with recycled materials and their distinct visual identity, it is still challenging for them to find locally available circular material options and comprehend their real environmental impact. Due to this difficulty, sustainable and circular design typically requires specialised experts, as well as more time and resources. To mitigate this issue and allow designers to be not only creative leaders, but also agents of sustainable material choices since the initial product conception, this project examines the possibilities of using advanced digital tools for facilitating the design process and, in particular, information flows between three key stakeholders: designers, furniture manufacturers, and waste managers (secondary raw materials). Interviews with these stakeholder categories led to identifying insights organised in three main problematic areas about circular materials: limited awareness

and mistaken perceptions; lack of trust in the environmental impact data; difficulty of choice and supply chain setup. Subsequently, based on the identified requirements, a twofold system of digital tools was designed, comprising an online platform for collecting and exploring circular materials, and a CAD software plugin for channelling circular materials into the design process, allowing designers to quickly confront estimates of environmental impact of different material combinations. AI-driven features have been designed into various workflows, from material uploading to search, recommendations and comparisons in natural language. The developed knowledge and experiments will contribute to a more effective digital toolbox for designers, allowing them to become leaders of circular transformation and proactive professionals who not only do the right design choices, but also help to establish local and circular supply chains.

KEYWORDS | SUPPLY CHAIN, LCA, MATERIALS, DESIGN TOOLS, ARTIFICIAL INTELLIGENCE

1. Introduction

In today's context, the transition toward a sustainable future is imperative and involves all sectors, with design playing a crucial role in this evolution. Designers are no longer just creators of form and function but leaders capable of driving change through design practices promoting sustainability, ethics, and innovation. One of the most urgent aspects, particularly, concerns waste management and the integration of circular production practices, which has become increasingly central in research agendas and industrial policies. The European Commission (2024) highlights how limited access to product sustainability information remains a significant barrier to design-based entrepreneurial initiatives, preventing a genuine transition to circular business models. In this scenario, designers can assume a leadership role by negotiating material use among the various stakeholders involved, creating co-creation networks that facilitate the reintegration of resources into production cycles. However, to effectively address this challenge, designers must have adequate tools and a solid knowledge base to make informed decisions.

This paper presents ongoing research that explores the use of digital tools. Appropriate tools can facilitate the adoption of circular solutions in complex production environments by supporting a more transparent and collaborative decision-making process (Eriksson et al., 2022). The goal is to improve product circularity by making crucial information accessible to various stakeholders and encouraging interaction among all parties involved in design and production. The research project focuses mainly on the Made in Italy furniture sector, which is known for its excellence but is still characterized by limited recycling, reuse, and certification practices (Silvius et al., 2021; Barbitano et al., 2019; Savelli et al., 2019). By using digital platforms for material and data exchange among designers, manufacturers, and other stakeholders, the project aims to develop an organizational model that can be replicated in other sectors, promoting circularity on a global scale. This approach not only helps reduce waste but also creates new market opportunities, focusing on enhancing economic and environmental sustainability.

In this article, the evolving role of the designer will be highlighted, as they not only increasingly assume leadership roles but also take responsibility for their ability to create networks that make strategic decisions with a positive impact on society and the environment. These skills can also be applied in entrepreneurial contexts to develop ethical and sustainable businesses that respond to global challenges. However, this process requires a shared understanding of co-creation dynamics and the ability to navigate different creative cultures while simultaneously changing organizational models

and adopting new digital tools (Cusumano et al., 2019). In this context, ethical leadership through design-driven entrepreneurship becomes central. As leaders, designers should face the dilemma of maintaining their creative essence while taking on new responsibilities. They should be capable of addressing the challenges of adopting circular business models, sustainable practices, and public-private collaborations. This paper will demonstrate how the evolution of design as a tool for building a more sustainable future also involves promoting a cultural shift that encourages dialogue, transparency, and responsibility. Moreover, in order to support these new paradigms, the research develops digital tools to be introduced between the various stakeholders.

2. Circularity in the Italian furniture value chain

The Italian furniture industry, valued at approximately EUR 17.5 billion annually, is a significant part of the EU market, ranking after Germany, the UK, and Poland (EEB, 2017). It is a cornerstone of the "Made in Italy" brand, recognized for its high-quality design and strong export contributions. The sector, largely composed of micro-sized enterprises concentrated in the North, faces growing challenges, including rising energy and raw material costs. To address these challenges, the use of secondary raw materials has gained prominence, positioning Italy as a European leader in circular economy (CE) practices within the wood-furniture sector (Symbola Foundation & Federlegno Arredo, 2016). However, the broader Italian furniture sector lacks full circular economy implementation, with companies mainly focused on activities directly related to business efficiency and immediate economic benefits such reducing raw materials or energy consumption (40%), developing low-resource production processes (36%) and environmental criteria for supplier selection (33%) (Fondazione Symbola & ENEL, 2021).

1.1 Procurements criteria and best practices

In this context, Mandatory Green Public Procurement (GPP) has emerged as a crucial driver for advancing circularity and sustainability within the sector, leveraging public sector purchasing power, which accounts for 14% of EU GDP (EU Commission, 2024). Italy's Minimum Environmental Criteria (MEC), mandatory since 2016, require the use of recycled or renewable materials, modular design, and non-destructive disassembly to facilitate reuse and recycling (EEB, 2017). GPP MEC for urban and indoor furniture, established by the Ministry of the Environment in 2015 and 2017 and updated by Ministerial Decrees (07/02/2023; 23/06/2022), provides a regulatory framework aimed at increasing the use of circular materials. The application of MEC has reached an average of 62% (Legambiente, 2024), contributing to the rapid growth of Environmental Product Declarations (EPDs), which rose from 5 in 2016 to 509 in 2024, demonstrating a clear shift towards transparency and sustainability. MEC criteria specify minimum recycled content requirements - ranging from 100% for wood to 5% for concrete - and address factors such as hazardous substances, energy efficiency, and recyclability. Compliance is verified through certifications such as EPDs based on life cycle assessment (LCA) and mass balance methods, ensuring traceability and credibility.

Also, environmental certifications play a crucial role in promoting circular materials and products. In Italy, certifications such as ReMade in Italy and Plastica Seconda Vita focus on verifying recycled and by-product content, while holistic schemes like Cradle to Cradle (C2C) consider broader circularity aspects, including material health. The research analyzed certification databases, including EU Ecolabel, C2C, ReMade in Italy, Plastica Seconda Vita, and EPDItaly, with a focus on the ReMade in Italy catalogue, which contains the highest number of nationally certified furniture products (ReMade, 2024).

Established in 2013, ReMade in Italy certifies recycled material content in materials, semi-finished, and finished products across various sectors. It requires traceability plans, supplier monitoring, and material classification, ensuring compliance with Green Public Procurement Minimum Environmental Criteria (GPP MEC). Certified products benefit from tax incentives and demonstrate environmental advantages such as reduced energy consumption and lower CO2 emissions. The ReMade in Italy catalogue for indoor furniture has grown to 184 certified products, with school furniture (42%) and seating (34%) as the most represented categories. However, certification adoption remains limited to a few large companies, with 70% of certified products belonging to just five firms. Only 15% of products achieve the highest A+ rating (more than 90% recycled content), such as the Sfera waste sorting container (97% post-consumer ABS). About 50% of certified indoor furniture contains over 60% recycled content, particularly in school tables and seats made of wood, metal, and plastic (MobilFerro). Plastics and wood dominate the certified materials, aligning with MEC criteria for indoor furniture, while coatings and other recyclable materials, such as paper, aluminium, and glass, are underrepresented Despite these advancements, full circularity adoption remains a challenge, as companies still focus primarily on cost efficiency and their numerous challenges in qualifying waste for production processes. Strengthening stakeholder engagement and aligning business strategies with evolving sustainable requirements – as GPP – will be key to further advancing circular practices in the Italian furniture industry (Donatello et al, 2017).

In this sense, the role of the designer can be important in catalysing new conceptual and operational frameworks, acting as an intermediary between the regulatory complexity and the relational complexity of the production and industrial fabric.

3.1 A framework for waste valorisation in the Italian furniture value chain

The research sought to outline a methodological framework, modelling the entire life and design cycle of a furniture product, including the flows of materials and waste, components and materials, and their secondary cycles triggered by the 9 R's (Refuse, Reduce (by design), Reuse, Repair, Refurbish, Remanufacture, Repurpose and Recycle)[1] (Reike, 2018) and introducing at the same time all the different information flows, necessary to make them possible. The close correlation between the material flow related to the product lifecycle and the flow of information that manages and accompanies the different stages that characterize it (figure 1), again emphasizing how the transition to a more circular economy is intertwined with its digital transformation (CENFIM, 2021). Both material and information flow together with the key documents allowing awareness of environmental and circularity profiles of materials and products.

Fitting into this general framework of circular design and production, the present research is introducing two interconnected digital tools (green in figure 1): an Online Platform for circular material (data) exchange and a CAD Plug-in to channel such material data directly into the design process of furniture, thus returning to the designer some of the key information related to the environmental impact of locally available circular materials. Therefore, the project focuses on the phases of material production and component production, where allowing designers and manufacturers to make more informed material choices could have a major overall impact.

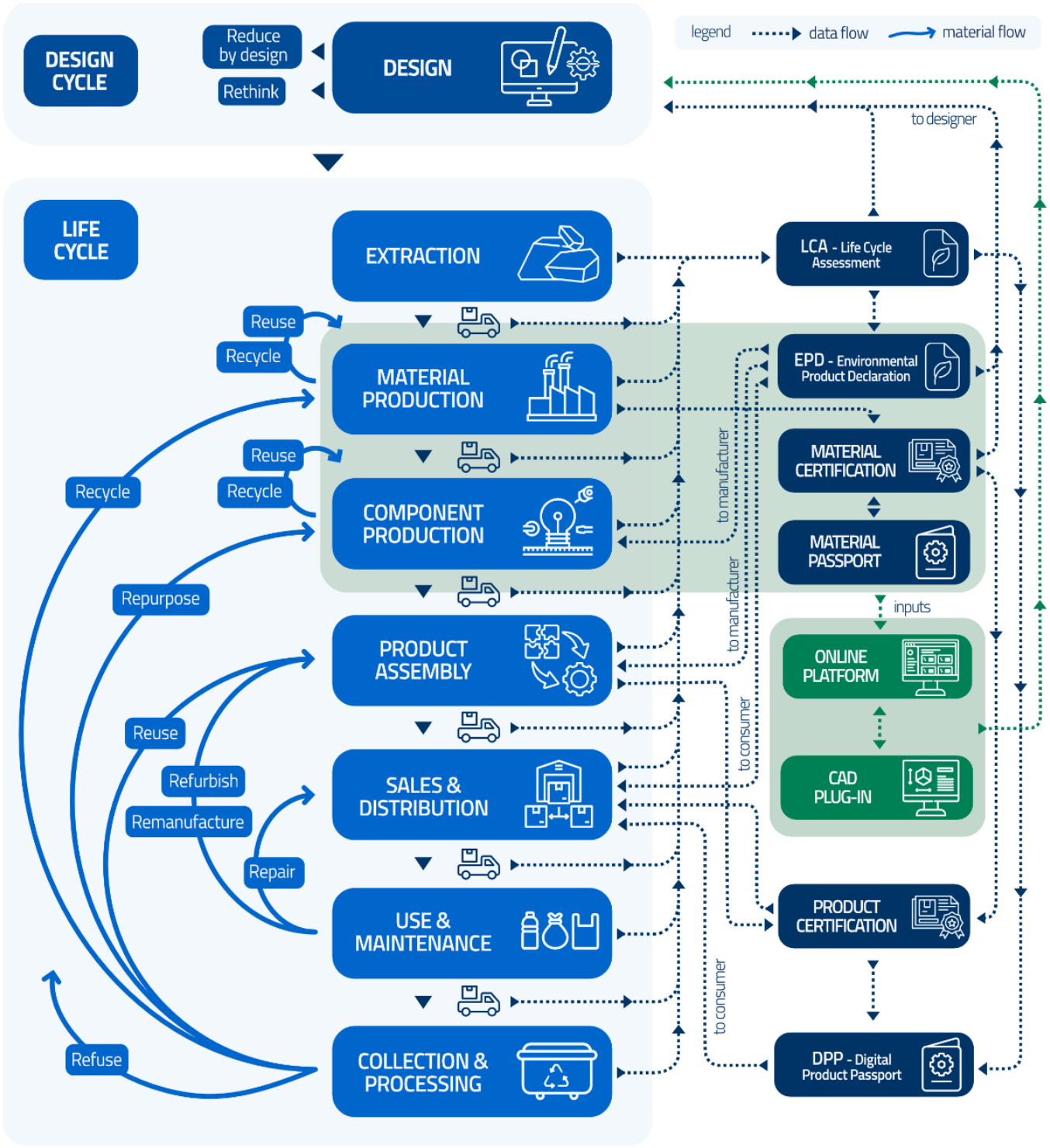

Figure 1. Flow diagram summarizing the methodological framework for circular design and production of furniture, based on enhanced data and information flows and on the implementation of the 9 Rs.

The diagram shows all the steps that contribute to the development of circular material- from the recovery and classification of waste/subproduct to the production and certification of semi-finished and finished products. This complex process requires characterization of waste materials, tracing their path, environmental study and technical/legal framing. For each identified phase, there are many actors involved (the supply chain, the manufacturing company, the reclaimers, the transporters, the laboratories for material testing, the intermediaries for the regulatory and certification part, LCA analysts, etc.), whose needs and any support tools already used must be coordinated with each other, reconciling requirements and resolving any criticalities: in this sense, the designer assumes the role of leader of the entire process, responsible for

effectively coordinating the different becomes professional figures with specific skills.
In this model, designers work by adopting a life cycle-oriented eco-design methodology, which implies their involvement not only strictly in the design cycle but also from a broader perspective in the production process and in consideration of all phases of the life cycle, using smart tools for sourcing secondary materials, for the valorisation of rejected components and parts, for the evaluation of the environmental profile of the designed product, etc. In this scenario, customers, whether businesses or consumers, need more detailed information about products and their sustainability characteristics, including life cycle environmental indicators (LCA Studies, EPDs, Digital Product Passports, and Material Passports). Data collection for each process therefore requires an appropriate digital infrastructure and data collection procedures that ensure transparency, traceability, and security.

Within this framework, rethinking and reducing by design approaches allow for the exploitation and optimization of in-house by-products and reused and recycled waste, end-of-life products reused after repair/remanufacturing/refurbishment actions, post-consumer waste reprocessed by recycling companies, and products that are rejected, i.e., not purchased by consumers. More conscious and informed decisions on behalf of the designers would make it possible to ensure greater material resource efficiency, right from the conception of the product itself, influencing the various stages of the production process and thus the entire product life cycle.

4. Key stakeholders for enhancing circular material use

To encourage conscious furniture design from the outset by giving designers a leadership role, this research is developing a multi-stakeholder system through advanced digital tools, as already anticipated in the previous section. Specifically, the aim is to promote the circular use of materials in the Italian furniture industry by facilitating connections between designers and key stakeholders: waste managers, who provide secondary raw materials or by-products, and furniture manufacturers, who can directly utilize circular materials. The development of these digital tools began with stakeholder mapping, followed by interviews to identify their problems and needs, ensuring their interest in the system participation.

4.1 Stakeholder mapping

The qualitative research phase involves adapting methods to ensure timely and relevant data collection across various disciplinary settings (Vindrola-Padros & Johnson, 2020). This phase includes semi-structured interviews to delve deeper into the information retrieved during the desk research phase (Safdar et al., 2021). Through a qualitative analysis of semi-structured interviews with key stakeholders, valuable insights and perspectives from individuals involved in the system have been retrieved, which has been ultimately clustered and analysed according to the project-grounded methodological approach (Corbin & Strauss, 2008). This analysis provides initial insights into the common knowledge base producers and manufacturers have about waste management within the Made in Italy production chain.
To map the stakeholders, the research analysed regulations and identified waste-generating processes using ATECO codes, which classify economic activities in Italy and define the eligibility for tax benefits and sustainability compliance. The study identified 56 ATECO codes linked to 487 industries relevant to waste management. Specialized consortia play a key role in intermediate recycling activities, aiding designers in creating

sustainable products.
For waste managers, the focus was on ATECO 38.32 ("Collection and sorting of materials"), identifying 113 companies, with 40 selected based on financial stability. Additionally, 45 manufacturing-related codes were analysed, particularly in fashion and furniture, identifying 374 companies, including 141 in Lazio for strategic collaboration.
For designers, the study prioritized professionals integrated into production chains. Eight ATECO codes covering consultancy and research were also identified for potential external collaboration.

4.2 Participant Organizations: roles and positions

After stakeholder mapping, the research conducted interviews with various types of stakeholders involved in the system, including two designers and six stakeholders:

- Designer 1 is an independent designer specializing in Product Design, Packaging, and Strategic Design.
- Designer 2 is an independent designer focusing on Product Design, with a particular emphasis on bathroom furniture design.
- Stakeholder 1 is a producer of indoor rubber floor coverings, which are mainly used in public buildings and private facilities.
- Stakeholder 2 is an intermediary in the environmental services sector that combines operational services with technical and scientific advice to reduce the environmental impact of its clients.
- Stakeholder 3 is a consulting and research company, specializing in the sustainability of materials and products, and in defining metrics for measuring the circular economy.
- Stakeholder 4 is a trade association that represents and defends the interests of inert waste recyclers to create the necessary conditions for the development and growth of the recycled aggregate market.
- Stakeholder 5 is an association reserved for operators in the rubber and elastomer recovery sector, fostering further aggregation potential in the area.
- Stakeholder 6 is a manufacturer engaged in the production of modular shop fittings, accessories, display windows, furnishing elements, and mannequins.

Initially, the roles were defined as designers, waste managers, and furniture manufacturers. However, the interviews revealed that these roles often overlap, making strict classifications challenging. For example, stakeholder 8, identified as manufacturers of furniture, also acts as a waste producer, managing production residues and seeking ways to valorise them. Similarly, some stakeholders take on hybrid roles, such as intermediaries (stakeholder 2 and 3) who provide consulting and technical services, or associations (stakeholder 4 and 5) that represent collective interests while also participating in the waste-material-product chain. This underscores the fluidity of roles within the circular economy, where organizations may shift roles throughout their operations, reflecting the system's interconnected nature.

5. Insights from the ecosystem

Among the various information that emerged during the interviews, problems and needs define a general pattern of topics that have been clustered according to three thematic groups: 1) awareness, communication, and market adoption, 2) quality, availability, and certification of information, and 3) product development, evaluation, and production processes.

5.1 Awareness, Communication, and Market Adoption

A key issue that emerged is the lack of awareness and market acceptance of circular materials, by which stakeholders 4 and 5 emphasized the need for specific marketing channels along with a more strategic engagement of the public to improve product perception, as recycled materials are often undervalued. According to this, stakeholder 1 highlighted the relevance of storytelling in promoting circular economy practices and stakeholder 8 pointed out that materials derived from materials such as MDF powder are often perceived as waste rather than valuable resources, limiting commercialization. Designer 2 emphasized the need for direct dialogue with technical offices that could enable better alignment between design and production constraints, even though the perception that companies are reluctant to adopt sustainable materials due to high costs, limited availability, lack of certification, and aesthetic concerns. In this case, it emerged that many businesses hesitate due to process adaptation challenges and fears of inefficiencies.
As highlighted by the interviewed designers and other stakeholders, the design of the final product plays a key role in creating engaging communication strategies. It serves as a strategic tool to help companies integrate sustainable materials by designing narratives on a multi-stakeholder interface that facilitates the exchange of intelligible and reliable material-related information among manufacturers, suppliers, and users.

5.2 Quality, Availability, and Certification of Information

Another major challenge is the lack of verified and accessible information about traceability, which affects circularity and sustainability. Indeed, stakeholders 2 and 3 emphasized the need for Digital Product Passports to improve transparency, pointing out that manufacturers often codify material information to protect supplier data, creating trust issues in material selection. Stakeholder 6 reported complex and time-consuming certification processes, delaying market entry for sustainable products. Additionally, ESG data collection is still manual and inefficient, lacking structured methodologies for LCA (Life Cycle Assessment) and carbon footprint calculations, highlighting that many companies claim to have no waste, making it difficult to assess material availability and sustainability impact.
To address these gaps, as highlighted by the designers involved, a comparative approach based on sustainability metrics could enhance the adoption of sustainable materials among manufacturers. Cross-referenced data could be integrated throughout the design and production stages, ensuring accessibility and usability for designers. By incorporating objective sustainability assessments, this approach would support informed decision-making and foster more responsible material choices in design processes.

5.3 Product Development, Evaluation, and Production Processes

Stakeholders 1 and 2 identified that managing multiple material attributes (e.g., cost, performance, quantity, aesthetics, environmental impact, logistics) is challenging due to the difficulty of evaluating and visualizing material properties, particularly in clear and intelligible data formats. In this regard, stakeholder 3 suggested that automated material recommendations and improved demand-supply matching could be beneficial. Additionally, stakeholder 6 highlighted challenges in scaling up sustainable innovations, citing high production costs and the need for innovation in the manufacturing chain. This includes integrating digital fabrication processes and adopting more adaptive and modular panels to ensure reliable traceability and regulatory compliance. These

challenges require the integration of a robust tracking system.
In product design and development, both designers emphasized the need for tools that support the assessment of material sustainability, comparison of options, and guidance for assembly with reuse in mind, while also estimating product longevity. They highlighted that digital tool, when enhanced by well-trained AI evaluation systems, could enable designers to make informed choices, ensuring materials align with sustainability goals while optimizing performance, longevity, and recyclability. Additionally, they stressed the importance of establishing direct communication channels between designers and manufacturers to streamline file preparation, prevent misinterpretations, and improve production efficiency.
Based on the results of the interviews, it is possible to outline a hypothetical path of development. Shifting from a linear model to a circular one requires shared responsibility in recycling and a design approach that prioritizes circularity from the outset. This means integrating sustainability data, optimizing supply chains, and ensuring cost-effectiveness to maintain competitiveness in a more sustainable Made in Italy. Key actions include implementing Digital Product Passports for traceability, strengthening legislative support, and launching marketing campaigns to shift perceptions of recycled materials.
Additionally, AI-driven tools for material selection, durability assessment, and assembly guidance can enhance efficiency, while fostering direct collaboration between designers and the diverse stakeholders will streamline sustainable production.

6. Guidelines for better tools

The digital tools proposed by the current research will need to respond to the issues raised by the stakeholders previously described, therefore the interview findings above were used as an input for identifying the system requirements and principles to follow. These will be discussed according to the same threefold division.

(1) The first group of issues revolves around the awareness of available circular materials both for designers, manufacturers and consumers themselves, who perceive quality as inferior. While communication to consumers is out of scope for this project, limited sustainability information may be addressed also with innovative digital tools. Waste exchange platforms are not a new concept, but there is no tool focusing on the territorial peculiarities of Made in Italy furniture. Participants highlighted the need to support various supply chains, with adequate differentiation of roles and functionalities.
(2) Another recurring issue is the lack of trustworthy information and the difficulty of finding the relevant pieces of information, especially in fields that are not (yet) heavily regulated. While software tools for Digital Product Passports are being introduced due to EU legislation, there is a twofold issue: material sources are sensible information for companies, while there is a general mistrust in how strictly companies follow sustainability standards. Better digital tools might help avoid unintentional omission of relevant details, and may proactively invite stakeholders to verify relevant indicators, and perhaps enhance practices.
(3) The final group of issues is about the product development and evaluation process. At the moment, designing with circular materials and setting up a trustworthy supply chain requires specialized expertise, thus making circular product development much slower and more expensive. Digital tools may help to bridge this information and expertise gap by providing sustainability knowledge and up-to-date supply information at the adequate points of the product design and engineering process, also relying on AI processing capabilities that became mainstream recently. Considering various in-house software solutions, a crucial aspect is interoperability: new digital tools should aim at openness and modularity, either through proper open-sourcing, or through public APIs (Application Programming Interfaces) so that any new solution may be quickly integrated

into existing tool chains.

Among these features, the key aspects that enhance designers' leadership capabilities are the expansion of information access and stakeholder collaboration through a seamless workflow. The tool should empower designers with data-driven decision-making by providing access to a national sustainable materials database and an AI assistant for comparative analysis. Simultaneously, it should facilitate direct interaction with other stakeholders, fostering collaboration and serving as a foundation for informed dialogue. To ensure a smooth and efficient workflow, the digital tool will be integrated into CAD software, allowing designers to incorporate sustainable materials seamlessly into their design process.

7. Enhanced workflows through new tools

Based on the previously discussed results of the analytical steps, both regarding current practices of evaluating material sustainability and regarding the mapping of stakeholder needs, the research has outlined practical examples of how the three categories of stakeholders would benefit from the multi-stakeholder system, describing the user journey for each of them. The hypothesized multi-stakeholder system consists of coherent workflows for three main users: designers, waste managers, and furniture manufacturers. Following previously described emerging opportunities, the digital tool integrates conventional CAD software with AI features and a recommendation engine to assist designers and manufacturers in material selection.

7.1 User Journey

On one side, the digital tool incorporates bottom-up processes by collecting data from waste managers through a web interface. Waste managers provide detailed information about their company and the materials they want to sell, including production details, material categories, aesthetic characteristics, and life-cycle parameters. Subsequently, designers and manufacturers can browse the material catalogue via the web interface, using filters to explore options and conduct comparative analyses of materials with AI-driven suggestions. The designer and manufacturer workflow concludes with material selection based on environmental impact and other parameters, leading to a purchase from the waste manager.

At the same time, the digital tool integrates with conventional CAD software, such as Rhinoceros, through plug-in. When the designer has finalized the geometric shape of the furniture, they can use the plug-in for material selection. The designer's workflow begins with the creation of material and shape groups by assigning parts of the geometry. The designer can then set multiple materials from the web interface to these groups. Finally, the designer can assess various material configurations through comparative environmental impact analyses, enhanced by AI suggestions, and apply the selected textures to the geometry for aesthetic evaluation. The system also incorporates top-down processes, involving the evaluation of various international and national environmental indicators. These indicators are narrowed down to two or three for integration as input queries, filters, and the basis for AI recommendations.

7.2 Interfaces

The research developed a set of mockups illustrating the user journeys, which involved

developing initial high-fidelity user interfaces of a website and a plug-in for CAD software. The website supports two main workflows: selling, for waste managers, and buying, for designers and manufacturers of furniture. The plug-in is designed especially for designers and requires basic CAD software skills.

The mockups were developed, to test with stakeholders, then refined, and finally developed into functional prototypes. Considering that this research is part of a larger project, the design system for Italian public digital services was chosen to ensure alignment and integration[2]. The main workflows were illustrated through a selection of mockups, in the following order: setting up material variants within the CAD software through a plugin (figure 3 and 4) and browsing and comparing materials through the web platform (figure 2).
Thus, the digital tool enhances designers' leadership by integrating the national sustainable material database, AI-assist, stakeholder network, and seamless CAD integration, enabling informed and sustainable decision-making in the circular economy.

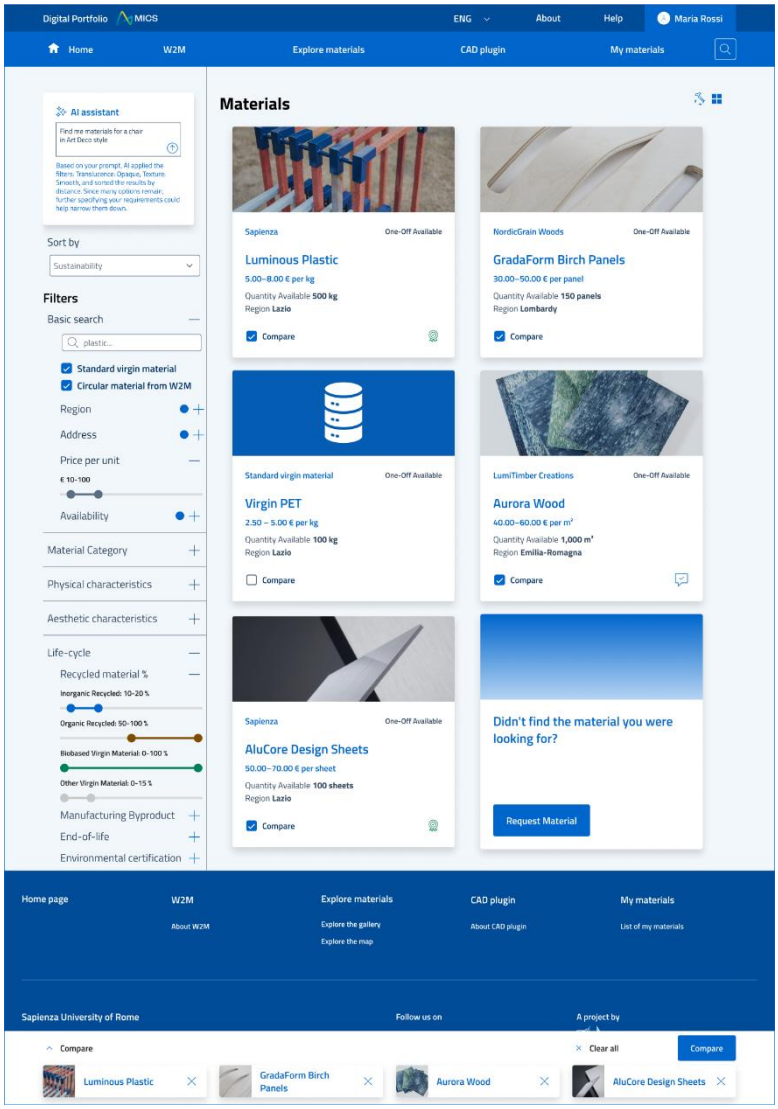

Figure 2. Catalogue of materials with filters for designers and manufacturers of furniture.

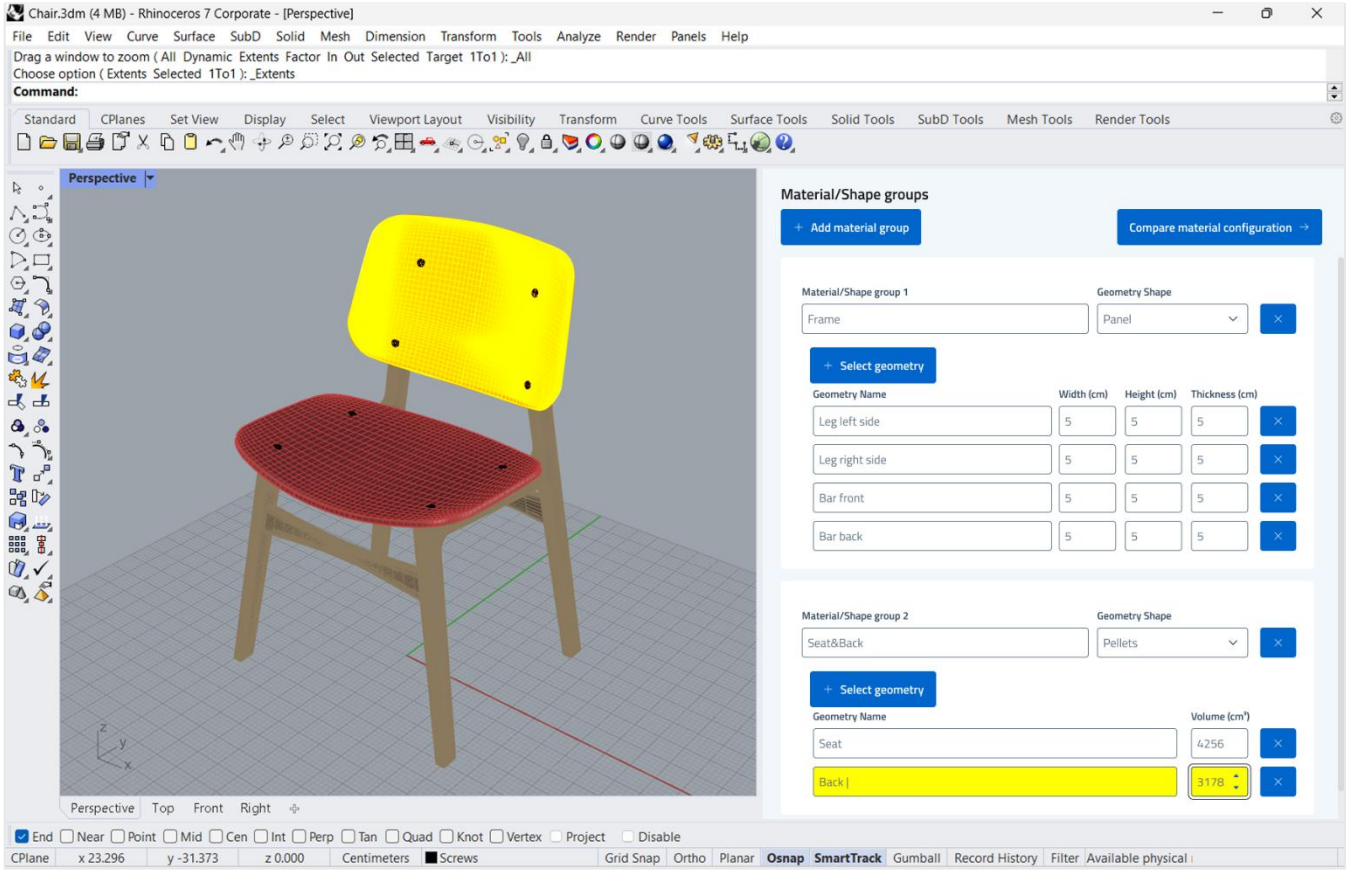

Figure 3. Interface for designers, integrated into the CAD software Rhinoceros 3D, for creating material/shape groups (groups of components that will be manufactured from the same material, with the same starting form, e.g. panels to be cut).

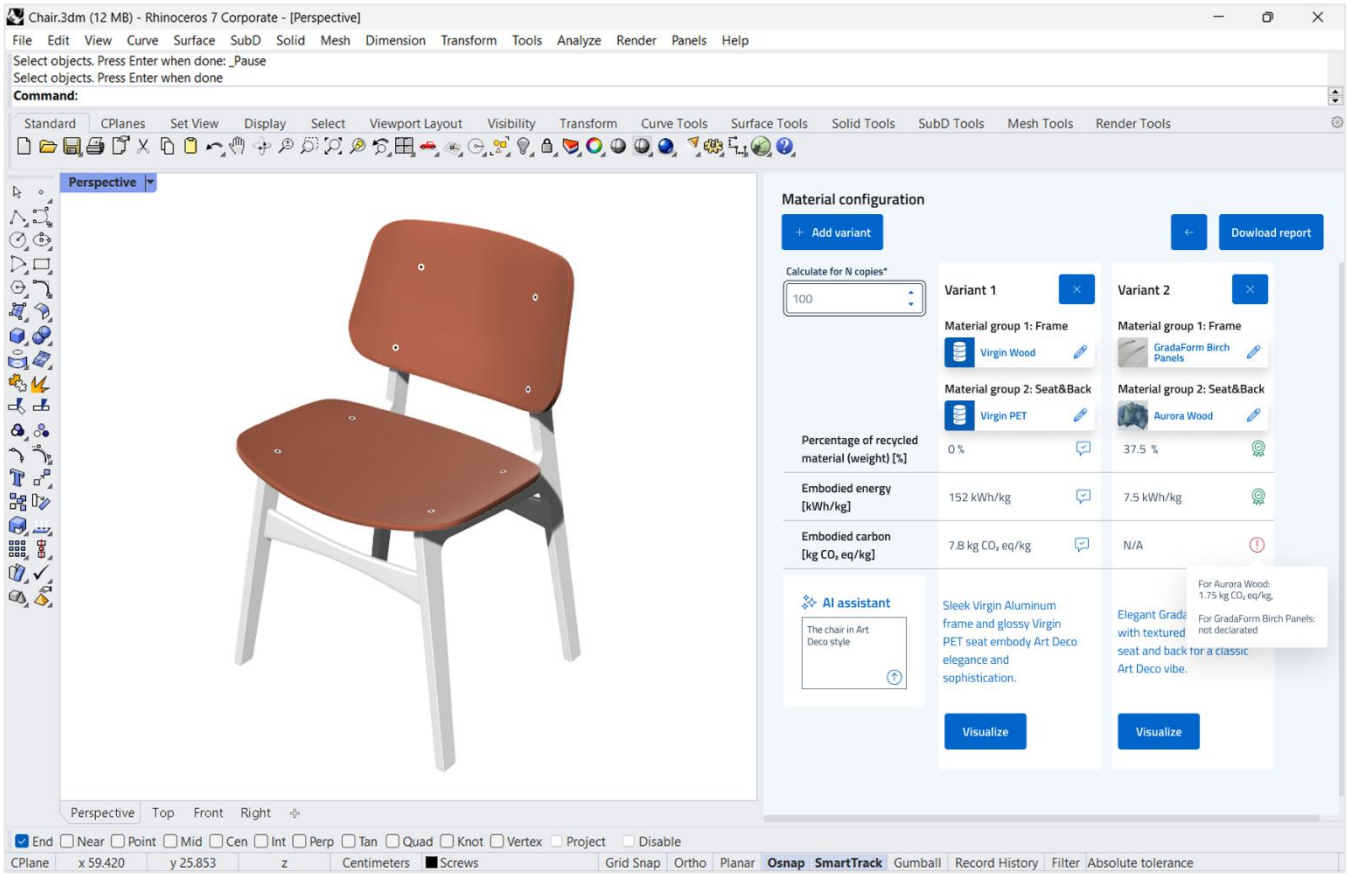

Figure 4. Interface for material variant comparison, once all materials have been associated with the material/shape group, with AI suggestions and a set of key sustainability metrics for comparison.

8. Advanced AI capabilities for the multi-stakeholder system

The proposed project is an innovative web-based platform designed to facilitate circular economic practices by connecting waste managers, designers, and manufacturers. A key technological advancement is the integration of AI-driven capabilities to efficiently manage, retrieve, and correlate unstructured data, optimizing material documentation and discovery.

Most materials-related information exists in unstructured formats, making it difficult to systematically retrieve and correlate relevant data. Traditional data extraction methods have relied on manual curation or rule-based systems, which are not scalable and require domain expertise. Large Language Models (LLMs) present a scalable alternative, enabling structured data extraction from diverse and unstructured sources (Schilling-Wilhelmi et al., 2024), significantly accelerating the discovery and reuse of recycled materials.

Waste managers use the platform to upload detailed information about recycled materials, including textual descriptions, images, and technical files compatible with modelling software. AI-driven structuring minimizes manual effort, ensuring consistency and accessibility. Designers and manufacturers, in turn, leverage advanced search tools powered by LLMs and retrieval-augmented generation techniques to discover suitable materials for their projects (Jiang et al., 2023). By iteratively refining query understanding through AI reasoning, the platform dynamically enhances search results, improving precision and relevance (Jiang et al., 2023).

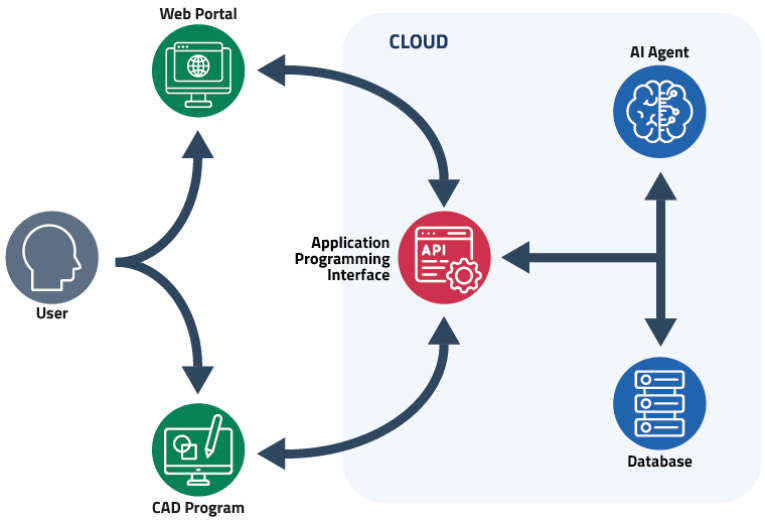

Figure 5. System Architecture Overview: The platform enables users to interact with a web portal or CAD program, which communicates through an API to access cloud-based AI processing and a structured database. The AI agent helps process unstructured data, while the database stores and retrieves material information efficiently, facilitating seamless integration between stakeholders.

At the core of the system lies the transformation of unstructured data into structured JSON outputs, making them easily searchable and integrable within a high-performance, cloud-based database. Research on AI-enhanced data retrieval has demonstrated that users modify their querying strategies over time, necessitating adaptive AI systems capable of learning and evolving with user behaviour (McCamish et al., 2018). This approach ensures that designers and manufacturers can iteratively improve their

material discovery process, shifting from static retrieval models to more intuitive and responsive search paradigms.

The platform architecture includes an intuitive web interface featuring file uploads, AI-powered search, and visual material representation. AI does not only serve a data structuring function but also significantly enhances user experience (UX), ensuring accessibility and ease of use. The relationship between AI and UX is reciprocal, where AI-driven recommendations and interactive assistance optimize decision-making while a well-designed UX increases AI adoption and effectiveness (Virvou, 2023). By leveraging AI-supported UX methodologies, the system dynamically adapts to changing user needs, facilitating seamless navigation and material exploration (Stige et al., 2023).

Additionally, the backend employs state-of-the-art AI models, such as OpenAI and Llama, to refine data structuring and improve search accuracy. Research indicates that AI-driven UX processes can optimize digital design by automating requirement gathering, enhancing solution development, and refining iterative evaluation (Stige et al., 2023). One of the most significant benefits of this AI integration is the drastic reduction in time required for data input and material discovery. Waste managers can populate the database more efficiently, while designers and manufacturers can quickly identify innovative recycled materials, focusing on creative applications. The API integration with Rhinoceros, a CAD software, further streamlines the workflow for designers and manufacturers.

9. Conclusions

This contribution has described the state of development of a research project that aims to enhance circular material use in the furniture industry, with a particular focus on the role of the designers and their information needs while matching consumer needs and desires with material possibilities as well as regulatory issues and sometimes conflicting stakeholder interests.

The paper started by outlining the Italian furniture value chain in relation with circularity, already subject of several studies and reports, which highlight a developing national (and European) system of sustainable furniture production, but also an increasing complexity that requires significant expertise to navigate. Within the long chain of processes in the life cycle of a furniture, the project chose to focus on the phases of material production and component production, and the designer's capacity to optimize these steps through informed decision-making upstream. Beyond designers, other key stakeholders such as furniture manufacturers and waste material transforming companies were interviewed, highlighting the sometimes blurry line between them. The resulting insights included three main problematic areas: limited awareness and mistaken perception of circular materials, lack of trust in the quality of environmental impact data about materials, and the difficulty of designing with circular materials and setting up an effective and reliable supply chain. These issues led firstly to identifying guidelines and features for better digital tools, then to the definition of enhanced workflows including the user journey and interfaces, as well as an outline of advanced AI capabilities, which may act as a well-informed "translator" between various professional figures who otherwise have difficulty with collaborating due to the differences in their professional jargons and mindsets.

Although the initial prototypes are promising, the subsequent in-depth experimentation will be necessary to understand the efficacy of the most advanced functionalities, especially the AI assistant that should be trustworthy and intuitive across various interfaces, and CAD Plug-in that should fit into various personal working styles of

designers. Future research should also examine whether and how much the tool should change to tackle different geographical areas (e.g. different material parameters due to different regulations) or to tackle other industries beyond furniture. While technical development is still in progress, hopefully the developed knowledge and experiments will contribute to a more effective digital toolbox for designers, allowing them to become leaders of circular transformation and proactive actors who not only do the right design choices, but also help to establish local and circular supply chains.

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DESIGNERS AND LOCAL ARTISANS IN TUSCANY. A BIDIRECTIONAL RELATIONSHIP FOR ENTERPRISE THE VALUE OF VEGETABLE-TANNED LEATHER

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ABSTRACT | This article investigates the dynamic and bidirectional relationship between designers and manufacturers within the tanning district of Santa Croce sull'Arno, in the Tuscany region of Italy. Recognized as a paradigmatic example of a "glocal" production ecosystem, the district embodies a complex interplay between deeply rooted local traditions and a far-reaching global impact in terms of both craftsmanship and market distribution. As an integral node within the global value chain, the district must continuously navigate evolving market dynamics, driven by broader socio-economic transitions and transformations. Through an in-depth analysis of this unique industrial landscape, the study highlights how traditional manufacturing entities can sustain their relevance by embracing innovation while preserving their cultural identity and economic viability. Central to this inquiry is the examination of case studies involving national and international design students and graduates who participated in a specialized workshop on vegetable-tanned leather, organized by the Consorzio Vera Pelle al Vegetale. This initiative served as a platform for knowledge exchange, offering a lens through which to assess the reciprocal influences between emerging designers and local manufacturing expertise. By exploring these interactions, the article underscores the potential of design education and collaborative practices to foster sustainable evolution within traditional production contexts.

KEYWORDS | MADE IN ITALY, GLOBAL VALUE CHAIN, CRAFTMANSHIP, CO-DESIGN, KNOWLEDGE EXCANGE

1. Contextualization

1.1 Made in Italy clusters and Global Value Chain

Made in Italy products, the fruit of the union between Italian design culture and manufacturing systems, are characterised by a constant creative relationship between tradition and the search for innovation. They are, therefore, products that share that unique mix of elements that determine their unquestionable recognisability at an international level. This peculiarity involves tangible and intangible elements deriving from its operators' specific know-how and design skills. Therefore, the aspects that characterise Made in Italy are the high specialisation of production techniques, the development context, the conception and realization of district products, and a strong rootedness in territorial specialisations. D'Amato states:

> Italian style owes its shape above all to that 'third productive force', halfway between craftsmanship and industry. [...] This mode of production, although driven by a constant orientation towards seriality, has transformed the concept thanks to the means of processing it uses: machine tools that are more complex than craft tools but less costly and constraining than the machinery of large-scale industry. (D'Amato, 2005).

The incursion of digital technologies has further influenced Italian design culture, both from a productive and creative point of view, accentuating the experimental value of the creative process. The combination of design, high manufacturing, and technologies now allows for the development of new poetics and new approaches to the values of the production system (Micelli, 2011). Significant examples of this evolved operating scenario include CNC machine usage, production planning and control software integrations and many scientific research integrations/implementations into the supply-chain. Thus, Made in Italy's excellence is not a turning point, and it must continue to innovate without renouncing its history and craftsmanship tradition, which are driven by the need for efficiency, sustainability, and competitiveness.

1.2 Italian SMEs and Global Value Chain

Global Value Chains (GVCs) are defined by OECD as the organization of international production, trade, and investments where different stages of the production process are located across different countries. GVC produces winning and losing products and services by the degree of its participants' contribution to new value-through-knowledge. Gereffi et al. (2001) refer to:

> [...] increased cost and importance of activities that deal with intangibles, such as fashion trends, brand identities, design and innovation, over activities that deal with tangibles, the transformation, manipulation, and movement of physical

> goods. As intangibles become more important, tangibles have become increasingly commodified, leading to new divisions of labour and new hurdles for developing country producers to overcome if they wish to enter these chains. (Gereffi, et al., 2001, p. 10)

In other words, tangible activities such as production tend to be outsourced to developing countries, while the intangible activities around branding, design, and innovation remain in more-developed countries. This causes a sort of geographic and cultural split in a product's identity (Goretti, 2017).

Walter Benjamin uses "aura" to denote the intangible spirit embodied in certain objects. Benjamin asserts that the aura [of the work of art] is connected closely with ritual function, explaining:

> The uniqueness of a work of art is inseparable from its being imbedded in the fabric of tradition. This tradition itself is thoroughly alive and extremely changeable. An ancient statue of Venus, for example, stood in a different traditional context with the Greeks, who made it an object of veneration, than with the clerics of the Middle Ages, who viewed it as an ominous idol. Both of them, however, were equally confronted with its uniqueness, that is, its aura. Originally the contextual integration of art in tradition found its expressio in the cult. We know that the earliest art works originated in the service of a ritual –first the magical, then the religious kind. (Benjamin, 1936)

If Benjamin's aura (or spirit) is conferred on the work through its presence in time and space (or place), the temporal and spatial definitions of tradition point toward continuity –rather than disruption or fragmentation– spatially (through place), and temporally (through transmission of information between generations). In contemporary usage, "genius loci" refers to the specific atmosphere of a place, and to the way in which the forms and objects produced in a specific place are adapted to it. Richard Florida claims that genius loci "maintains a proper balance between the natural elements and culture, multiple representations of the intangible values referred to this place" (Florida 2003). Hand-crafted production expresses the phenomenology of intrinsic place identity through such factors as local materials and regional know-how.

2. Designers and artisans in industrial districts: a theoretical framework

While the industrial clusters literature acknowledges that competitive new product development depends on relationship-building activities, from a design perspective, informal social relations enable the development of new products as they can inform new business directions (Bertola & Teixeira, 2003). Therefore, design participates in new product development through "a process of interactive construction that tries to reach the precise scope of shaping a new artifact" (Maffei & Zurlo, 2000). In these terms, design in industrial districts primarily supports new product development by synthesizing and codifying technical and market knowledge. Bertola and Teixeira (2003) define the design capabilities of outsourcing in contexts of informal knowledge circulation as a main competitive advantage for companies participating in industrial districts. Indeed, the codification and synthesis of external users' and network companies' knowledge allowed

companies to define new trajectories for their business that eventually led to collaborative actions in new product development. designers act as mediators or translators, deploying interactional rather than direct contributory expertise.

This form of contribution appears particularly relevant in collaborations between artisans operating in the SMes and designers: the formers physically work with materials, forming them into artefacts; while the latters aim at "articulat[ing…] findings or judgement, and sometimes to translate the expertise of one domain into the language of another" (Collins and Evans, 2019, p. 37)In terms of the T-shaped model of skills, designers would personify the horizontal stroke of the T with their "disposition for collaboration across disciplines"; and artisans the vertical stroke of the T with their "depth of skills" (Brown, 2011).
While design absorbs knowledge embedded in communities and industrial networks, it can mediate between the company's internal scope of shaping a product and the territorial context (Celaschi et al., 2009). As Deserti and Zurlo (2011) emphasize, the main contribution of design capabilities to distributed and interactive dimensions of local production systems concerns the ability to interpret the external users' knowledge and the company's needs. By closely interacting with the companies' entrepreneurs and communicating with heterogeneous stakeholders due to empathy and visual communication skills, design supports the realization of companies' intents in a context of interactive knowledge.

In Italian industrial districts, we highlight on a unique integration of design and manufacturing underpins the enduring success of many of these districts in the global market. Therefore, the SME and its artisans become indispensable to the designer's ability to realize the sample or collection.
The industrial districts' literature widely acknowledges the social dimension of local production systems as the primary enabler of productive interactions for new product development (Becattini, 2002; Morosini, 2004). Therefore, knowledge spillovers, co-located creativity, and the collective development of innovations allowed companies to improve their competitive performance toward the efficiency of the industry they belonged to. Furthermore, as sociological contributions on industrial clusters emphasize (Granovetter, 2018; Uzzi, 1997), the embeddedness of the social structure in local production systems, namely the informal ties and personal relationships, supported the development of superior products as it drawn on tacit knowledge exchange. When tacit knowledge exchange allows for developing products that are hard to replicate, it represents a competitive advantage for companies (Benkler, 2006).
In Made In Italy manufacturing system, the craftsman operating in the SMEs clusters is conserared as a subcontractor for the designers enrolled by the major fashion or design corporations that often acts as a "problem solver" with the ability of implementing the "desires" of designers. In fact, the SMEs it becomes crucial for designers to realize the first sample in the process of development of products for large companies (often part of global financial groups). Even if this process is recognized by brands, the craftsman is not considered part of the design process, but only a producer with a secondary role compared to the designer (Fry et al., 2016)
Thus, we highlight on a dominant position of external designers in this dialectic relationship. According to this perspective, Zhang (2016) critiques the dominant role of external designers calling the artisans as just "workers" to achieve their concepts. Conversely, Bhatt (Vencatachellum, 2005) points out that collaborating with designers only rarely provokes new understanding or open new perspectives for artisans.

2.1 Collaborative Dynamics in Design and SMEs' Craftsmanship: The Role of Co-Creation and Outsourcing Production

The transmission of artisanal knowledge has traditionally been based on apprenticeship systems within guilds and communities of practice (Sennett, 2008). More recently, some artisans have begun to operate within academic contexts, contributing an insider perspective to the analysis of professional practices and studio creation processes (Groth, 2015; Mäkelä, 2016; Niedderer, 2012; Nimkulrat, 2009, 2012). However, the literature on collaborative dynamics within professional artisanal practice, particularly in the context of co-design and co-creation, remains limited.

Pirita Seitamaa-Hakkarainen and her research group have explored co-design in artisanal and design processes, although most of these studies have been conducted in educational settings (Härkki et al., 2016; Lahti et al., 2016). Other significant contributions come from the work of Anne-Louise Bang, who has explored textile design through participatory approaches based on dialogue and play (Bang, 2010; Bang & Christensen, 2013), and from Arild Berg's research, which analyzed collaboration in ceramic art, highlighting how it strengthens not only the artistic integrity but also the personal and professional integrity of the participants (Berg, 2014).
In product design and industrial design, knowledge of materials and production techniques is crucial. However, given the increasing complexity of manufacturing processes, designers cannot always possess specialized knowledge of all production stages. Consequently, outsourcing to artisanal professionals has become a common practice, involving a process of mutual learning: on the one hand, the designer must understand the properties and limits of the materials; on the other, the artisan must assimilate the design intent, including the desired style and atmosphere.

A key element in co-creation processes is the sharing of project authorship. However, as highlighted by Groth and Berg's studies, in some contexts, salaried remuneration can lead to the relinquishment of authorship by the artisan. Designers may exhibit a certain mistrust of the artisans' intrinsic motivation and their responsibility for the project's success. This issue has also been observed in other creative sectors, such as the film industry, where co-authorship between screenwriters and directors develops through an ongoing collaborative process (Pelo, 2010). A similar model could be applied to the relationship between designers and artisans, emphasizing the recognition of each actor's contributions, similar to the credits in a film or academic citations.

Outsourcing production to artisans also raises questions related to professional identity and project authorship, which often remains attributed to the designers. Co-creation relies on a balance of mutual trust and the recognition of each collaborator's contribution. The quality of the final output is subject to negotiations, as there are variable quality standards shared among the different actors involved. For the process to be effective, clear and real-time communication is essential, especially when adjustments are required by design or production constraints. The direct involvement of designers in the manufacturing process is, therefore, a key element in facilitating an understanding of the necessary changes and promoting the sharing of experiential knowledge of the production process.
An interesting boost to the development of this relationship and the roles in this negotiation process can be seen in the growing demand for transparency from consumers in the apparel and food industries. Knowledge of the origin of materials and ethical production standards influences the relationship between consumers and brands,

as well as the perception of the company's social responsibility and that of the individual actors involved (Nguyen et al., 2015).

3. Case Study: The Italian Context and Santa Croce Sull'Arno District

In the production process of the design and fashion system, the Italian leather tanning industry stands out as a sector of absolute significance. Furthermore, this production system offers an interesting insight into the relationships between the design departments of large corporate brands (e.g., LVMH, Kering, Prada, etc.) and the manufacturing districts. According to the 2023 report on the Italian Leather Industry by UNIC (Italian Leather Union), the national tanning industry employs 17,882 people, consists of 1,139 companies, and has an annual average turnover of 4.3 billion euros. Within this productive context, 4.1% of the production is destined for the apparel sector, 33% for footwear, 31.1% for leather goods, 15.7% for automotive applications, 13.7% for furniture, and 2.4% for other productions. The regions most characterized by this production sector include Veneto, with 8,538 employees, Tuscany with 5,956 employees, Campania with 1,937 employees, and Lombardy with 912 employees.

The leadership of the S. Croce sull'Arno Industrial Leather District is summarized by its production capacity (accounting for 30% of Italy's leather production and 98% of the sole leather production), the scope of its export activities (almost 70% of the total turnover comes from foreign sales), and its environmental achievements (over 98% of the total pollution load produced by the companies in the area is treated). This success is attributed to a nearly unique philosophy in the world: district-based management. This concept translates into the centralized management of all tanning-related activities, including organizing trade fairs, promotional initiatives, and addressing the most critical challenge: the environmental impact of industrial production.

The first tanning activities date back to the first half of the 1800s. After World War II, the industry expanded and became integrated into the urban fabric of the municipalities within the district. This area has always been linked to leather tanning, with origins in craftsmanship, where small tanneries initially operated within homes in rural villages. Over time, production expanded, leveraging new technologies and gaining increasing importance in reference markets. The process of relocating production facilities—from urban centers to newly established industrial zones—began in the 1970s, marking the start of industrialization through a strategy developed by local public administrations in close collaboration with businesses, represented institutionally by their trade associations. It was during this period that the concept of district-based operations began to take shape, fostering a unified spirit among entrepreneurs to tackle the most pressing issues in their activities. Trade associations gained operational strength, representing companies at the institutional level and providing the district with specialized knowledge to address emerging challenges (Consorzio Vera Italiana Pelle Conciata al Vegetale report 2023; Vallini, 2013).

3.1 The Sustainability Challenge and Vegetable-Tanned leather

On one hand, the strength of the S. Croce sull'Arno Industrial Leather District can be attributed to the remarkable production capacity of its companies. On the other hand,

the value gained in international markets by Tuscan tanneries lies in the philosophy with which central issues of leather tanning activities have been addressed. The reference here is to the environmental issue, without which it would not have been possible to continue this type of production. Making development sustainable became necessary when the Italian government decided to establish concrete and essential regulations for environmental protection, setting inviolable parameters for pollution produced by companies.
Rather than equipping each company with an individual purification system, the district-based philosophy suggested creating specific solutions for each problem posed by leather production. This is why there are two treatment plants in the area, which receive the wastewater from all tanneries every day, treating them as if they were a single discharge. This is also why in the S. Croce sull'Arno Industrial Leather District, companies are dedicated to the recovery and disposal of the so-called "by-products" of the tanning industry. The creation of this network of companies specializing in decontamination was made possible by the concerted efforts of public institutions and leather entrepreneurs, who, through their trade associations, addressed the situation.
The large and complex initiatives carried out by the sector in this area were entrusted to the following organizations:

- Consorzio Aquarno: Wastewater treatment plant.
- Ecoespanso: Design, construction, and management of a plant for processing the sludge produced by the district's treatment plants.
- Consorzio Cuoiodepur: Management of the purification plant servicing the tanneries.
- Consorzio Recupero Cromo: Collecting chromium-bearing wastewater for the extraction of chromium.
- Hydro SpA: Transforms animal by-products from leather processing (fleshings and trimmings) into hydrolyzed proteins, fertilizers, and technical products for agriculture.
- Polo Tecnologico Conciario (PO.TE.CO): Since 2002, it has been working in research, training, innovation, and technology transfer; thanks to its experience in the sector and the skills and professionalism gained over the years, PO.TE.CO supports companies in the leather industry by providing its human and technological resources (Consorzio Vera Pelle Conciata al Vegetale, 2023 report).

One of the most successful outcomes of this strategy was undoubtedly the recovery and "regeneration" of a traditional tanning practice from the district, which exclusively used vegetable-based leather treatment substances and excluded chemically intensive processes with significant environmental impact. "Vegetable-tanned leather" is the result of an ancient artisanal process, passed down through generations with minimal changes, based on natural materials: hides, tannins, fats, oils, and natural proteins. This innovation, which bridges the past and the future, has achieved significant market success, placing the district at the center of interest for international brands and players in global leather production. As the President of the Consortium, Leonardo Volpi, explains: "Vegetable-tanned leather is a niche product for high-quality, durable goods, with an average annual turnover exceeding 130 million euros, and an export share of 55%."
A centuries-old concept of circularity, that of vegetable tanning, has always been based on natural products, preserved for centuries by Tuscan master tanners. While continuously evolving, without renouncing its origins, today the production process is moving towards zero waste: hides, scraps, and trimmings can be transformed into

agricultural fertilizers with high carbon capture performance. The research conducted by Ars Tinctoria, a chemical research laboratory on tanning techniques established in the S. Croce sull'Arno district, has developed an innovative method for measuring the carbon content derived from biomass and the presence of petroleum derivatives in any type of organic material through SCAR spectrometry, a cutting-edge technique implemented in collaboration with PPQ Sense (a spin-off of the National Institute of Optics). This research has measured the bio-based carbon content and the presence of petroleum derivatives in samples from tanneries in the Tuscan district, comparing them to those in alternative materials. The research confirmed that the analyzed leathers, treated with plant extracts according to the production guidelines of the Consorzio Vera Pelle Italiana Conciata al Vegetale, achieved bio-based carbon content of around 95%, placing them in the highest range (80% - 100%) of contemporary biological materials such as cotton and wool, compared to an average of 25% in so-called sustainable alternative materials made from cactus, pineapple, apple, or other plant-based sources (Consorzio Vera Pelle Italiana Conciata al Vegetale, 2023 report).
The Consorzio Vera Pelle Italiana Conciata al Vegetale, which has been promoting the tradition of vegetable-tanned leather in Tuscany since 1994, has implemented a series of initiatives to address sustainability comprehensively: research, a production code for its members, and a communication campaign. This promotion primarily focuses on the designer-manufacturer relationship, involving large corporations that commission production, associated designers, and SMEs within the district's production cluster.

3.2 The Workshop Program on Vegetable-Tanned leather

Aligned with the mission of the Consorzio Vera Pelle Italiana al Vegetale, since 2014, the Consortium has curated a series of specialized workshops aimed at fostering an in-depth engagement between emerging designers from leading international design and fashion schools and the technical, material, and aesthetic properties of vegetable-tanned leather. These initiatives extend beyond traditional educational frameworks by integrating site visits and immersive design residencies at the Consortium's headquarters, facilitating direct interaction with the distinctive material culture and production expertise of the Santa Croce sull'Arno tanning district.
This program strategically seeks to bridge the existing gap between design education and the technical complexities of vegetable-tanned leather, incorporating the latest advancements in chemical research and production methodologies within the district. The active involvement of companies affiliated with the Consortium further enriches the initiative, as artisans and manufacturers contribute their expertise, providing young designers with direct exposure to the intricacies of craftsmanship.
The overarching objective of these workshops is to cultivate a collaborative paradigm between designers and producers while fostering a deeper understanding of artisanal practices among emerging professionals who will later assume key roles within design and fashion industries. By enabling designers to engage with the often implicit and otherwise challenging-to-grasp nuances of traditional craftsmanship, the initiative not only enhances material literacy but also promotes sustainable design innovation.
From 2014 to 2023, these workshops have yielded significant outcomes, generating collaborative design processes and fostering the co-development of prototypes that reflect both contemporary creative exploration and the enduring value of traditional manufacturing expertise within the district's SMEs.

As part of the 2015 workshop, the work by Maria Sole Ferragamo, representing Central Saint Martins with the collection Cutting Edge, gained significant importance. The designer is also the founder of the project SO-LE STUDIO (https://so-le-studio.com/). The work presents an explorative journey through the materiality of vegetable-tanned

leather, utilizing a jewelry designer's perspective and approach to revisit three traditional women's garments. These garments originally served as shields for protection, now reimagined within the intimate relationship a wearer forms with a product that ages alongside them, telling a personal story.
"Leather remains in its natural state" Ferragamo says "and stretch is achieved through cuts. The process "cut-wet-stretch-mould-dry" serves an aesthetic purpose, opening the cuts to reveal a subtler materiality. The same processes are applied with a structural necessity, as the entire piece is supported solely by the rigidity of the leather strips.

Fig. 1 - Maria Sole Ferragamo, *Cutting Edge Collection*, 2015 (source: Consorzio Vera Pelle Italiana Conciata al Vegetale)

As part of the 2016 workshop, Kira Goodey, representing the Royal College of Art, presented the collection *Orlandi's Opera*. The designer currently provides consultancy services for prominent design brands in the fashion system (https://www.kiragoodey.com/). In 2021, she created leather shoes (made from vegetable-tanned leather) for Iris van Herpen's collection (https://www.kiragoodey.com/archive/iris-van-herpen-ss21-couture-roots-of-rebirth).
As expressed by Kira Goodey:
"Working with veg-tanned leather was a new and deeply rewarding experience for me. Throughout Craft the Leather, we gained an intimate understanding of all aspects of the leather – from material properties and manufacturing to its cultural significance in the Tuscan region and the measures necessary to minimize environmental impacts. Such a profound insight into a material fosters a personal emotional relationship and, with that, a deep respect. Working with the leather was so much more than merely handling the raw materials, although the unique properties of veg-tanned leather – its ability to be sculpted, molded, colored, finished, made hard as wood or soft as velvet – allowed the material itself to shape the design process." (Source: Consorzio Vera Pelle Conciata al Vegetale).

Fig. 2 - Kira Goodey, *Orlandi's Opera*, 2016 (source: Consorzio Vera Pelle Italiana Conciata al Vegetale)

Another interesting example of the relationship between the properties of vegetable-tanned leather and design processes was undoubtedly represented by the work of Balbina Brunell, representing Parsons – The New School, during the 2023 workshop, where she presented the collection *An Analogy of Tarnished Culture*. Indeed, the collection fully expresses the technical properties of vegetable-tanned leather, particularly with a focus on the potential of vegetable-tanned leather in evolving and transforming.

Fig. 3 - Balbina Brunell, *An Analogy Of Tarnished Culture*, 2023 (source: Consorzio Vera Pelle Italiana Conciata al Vegetale)

Another interesting project presented during the 2023 workshop was by designer Shiyu Gong, representing the London College of Fashion, with the collection *Wearing Etiquette*. The fabrication techniques used include wet-moulding and weaving leather in combination with bamboo. The designer focused on how the leather transforms from being moulded and stitched over the form of human hands and seamlessly shifts into an open weave with bamboo tips. Working with leather SMEs has taught the designer the benefit of crafting with quality, where material manipulation is fluid, and the surface remains smooth and delicate.
In the product design sector, another area that significantly involves the production of vegetable-tanned leather, we highlight the work of Korean designer Junsu Kim, who

participated in the second edition of the workshop in 2013. Junsu coils and piles up leather strips of different thicknesses and lengths to form a shape. He then finishes by polishing or lacquering the surface. The designer works with vegetable-tanned leather, so the surface can be smoothed by friction, deformed by water, and tanned and darkened by sunlight. Despite being processed, this material retains vitality. He prefers cowhide because it has a denser and stronger tissue than other leathers (https://www.homofaber.com/en/discover/junsu-kim-leatherworking-korea-republic-of). Junsu presented a leather vessels collection at the Homo Faber exhibition in Venice (Italy) in 2024. He has collaborated with relevant international luxury brands such as Loewe (https://theroom.loewe.com/en/artists/junsu-kim/; https://loewe.craft.prize.staging.makemepulse.com/en/artists/junsu-kim).

Fig. 4 - Junsu Kim, leather vessels collection , 2024 (source: homofaber.com)

4. Discussion: A Systemic and Material Perspective on Innovation in the Santa Croce District

4.1 Dormant Resources and Systemic Innovation in the Vegetable Tanning District of Santa Croce sull'Arno: A Theoretical Interpretation

The concept of dormant resources—understood as latent resources that are not immediately visible or utilized within a productive system—offers a valuable theoretical lens for interpreting innovation dynamics within traditional manufacturing districts (Goretti, 2023). According to a systemic and transformative approach to design (Manzini, 2015), these resources can be activated through co-design practices, intersectoral collaboration, and the valorization of tacit knowledge, thus contributing to the transition toward more sustainable and resilient models.

In the context of the vegetable tanning district of Santa Croce sull'Arno, at least four categories of dormant resources can be identified:

- Leather processing waste, which is currently treated as a disposal material but could be upcycled or transformed into bioproducts for other sectors (e.g., cosmetics, bioenergy, innovative textiles);
- Local artisanal know-how, often informal or non-codified, which could generate high value-added outcomes if integrated with contemporary technologies;
- Intersectoral collaborations, still underexplored, involving designers, agronomists, and biotechnologists in the creation of hybrid materials and circular solutions for the sustainable fashion industry;
- Agricultural residues from the local area, such as chestnut peels or olive leaf extracts, which could serve as sources of natural tannins to enhance the environmental sustainability of tanning processes.

The activation of such dormant resources is not linear; it requires the construction of an open territorial innovation ecosystem grounded in knowledge sharing and co-creation processes. This aligns with the Living Lab approach and the notion of glocal districts (Asheim & Gertler, 2005; Hillgren et al., 2011), in which transformation occurs through the interaction between local actors and global networks.

The Santa Croce sull'Arno district can thus be considered a paradigmatic example of a "glocal" productive ecosystem, capable of maintaining strong territorial embeddedness while responding to global dynamics through open production, distribution, and collaboration models. Within this framework, designers act as "cultural enterprises" (Arquilla et al., 2011), generating new design scenarios and hybrid value propositions.

A further theoretical contribution comes from new materialism, which challenges anthropocentric paradigms in design and recognizes the agency of materials. Bennett (2010) describes materials as "vibrant actants" that exert influence over creative processes, while Coole and Frost (2010) emphasize that the interaction between matter and human intentionality can lead to unpredictable effects. In this light, vegetable-tanned leather should not be seen merely as a passive substrate but as an active design agent whose agency shapes both form and function, as argued by Malafouris (2008) and Bolt (2007, 2013).

This perspective reinforces the notion that innovation in traditional districts is not only technological but also cultural, epistemological, and methodological. The reactivation of dormant resources through systemic design may thus represent a strategic lever for the future of Tuscan craftsmanship—not as a heritage to be preserved, but as a dynamic platform for material and social experimentation.

4.2 Co-creation and Innovation in the Leather Tanning Supply Chain: Insights from the Workshop

The design workshops conducted with students and local leather artisans within the vegetable tanning district of Santa Croce sull'Arno provided an opportunity to investigate the latent potential of dormant resources, through the lens of co-creation. This section draws on a case study approach (Yin, 2017) and connects the empirical findings to the theoretical framework of

new materialism (Bennett, 2010; Bolt, 2007, 2013; Coole & Frost, 2010; Malafouris, 2008), focusing on the interplay between design processes, material agency, and systemic innovation.

First, the workshops foregrounded the role of experiential knowledge exchange. Students engaged directly with vegetable-tanned leather, adapting their design proposals based on the affordances and limitations of the material. This tactile and iterative process encouraged a situated form of learning (Schön, 1983), through which the students developed an embodied understanding of the material's behavior. Importantly, this led to a reconfiguration of the design authorship, where the initial concept was continuously negotiated and reshaped in dialogue with artisans. As Hennessy and Murphy (1999) argue, such collaborative processes—while challenging—enhance the quality and adaptability of design outcomes. The resulting artefacts cannot be attributed to a single author but rather emerge from the entanglement of practices, knowledge, and materials.

Second, the co-creative dynamic between students and artisans revealed critical insights into the activation of dormant resources. The tacit and situated knowledge of local artisans—often excluded from conventional design processes—was brought to the forefront and translated into innovative outputs. This aligns with the view that dormant resources are not merely underutilized but require specific socio-material conditions to be activated (Manzini & Rizzo, 2011). Furthermore, the workshops highlighted how new design perspectives can function as catalysts for reinterpreting traditional practices, generating hybrid solutions that bridge material tradition and contemporary innovation.

Third, the workshop setting acted as a prototype for an open innovation ecosystem, where knowledge circulation and collaborative practices were facilitated across disciplinary boundaries. This resonates with Arquilla et al. (2011), who position the designer as a pivotal figure in the orchestration of new service-product offerings and innovation scenarios within complex production environments. In Santa Croce sull'Arno, the iterative and reflexive character of the workshops fostered resilience, supporting the tanning district’s capacity to navigate contemporary challenges in sustainability and competitiveness.

In sum, the workshops exemplify how co-creation can contribute not only to product innovation but also to a deeper understanding of systemic and cultural transformations. By valorizing latent material and human resources through design, these practices reinforce the notion of design as a mediating and transformative activity, capable of shaping more sustainable and context-sensitive industrial futures.

5. Conclusions

The analysis conducted highlights both challenges and opportunities within the collaborative dynamics between designers and artisans. One key issue is the failure to value the role of artisans by designers, who often appropriate the authorship of the project without acknowledging the decisive contribution of artisanal skills. This situation is widely discussed, but concrete solutions to overcome it remain scarce. Therefore, it is necessary to develop new

business models that go beyond simple outsourcing of production, recognizing the artisan not only as an executor but as an innovator and co-author of the creative process.

Artisanal skills represent a dormant resource, as they are often tacit, intangible, and complex, as well as interdisciplinary. Their valorization requires more effective communication strategies from production districts, similar to those already employed to promote traditional materials, such as vegetable tanning in the Santa Croce sull'Arno district. In this sense, studying artisanal expertise from an interdisciplinary perspective is crucial today (Gibbons, 1994). Analyzing the challenges and potentials of collaboration can help identify new methodologies to enhance the experiential knowledge of the artisan and their material agency.

Recent studies on co-creation confirm that the success of a project heavily depends on the relationships between participants (Greenhalgh et al., 2016). However, while in service co-design, mutual trust and shared responsibility are enabling factors (Pirinen, 2016), it remains to be verified whether these elements are equally effective in the manufacturing context. The case of the Santa Croce sull'Arno leather district, analyzed in this study, highlighted how interactions between designers and artisans are often characterized by a disconnection between design expectations and material realization.

One of the most critical aspects concerns the measurement of reciprocal learning in the co-creation process. The ineffability of tacit knowledge has led researchers to develop strategies for obtaining reliable evidence by analyzing the production environment as a context imbued with intuitive understanding of the phenomenon. A possible methodology involves participatory observation to identify key moments in the collaboration process—those "experiential momentum" moments that allow the project to progress. These moments, often unspoken, constitute implicit awareness and can be analyzed from theoretical, creative, or narrative perspectives, becoming deeply integrated into the design process.

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DESIGNING BEYOND SPECIESISM: EMBRACING MULTISPECIES CULTURES IN INSECT BIOREFINERY.

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ABSTRACT | Development is not a neutral phenomenon; thus, an ethics of care framework is essential for addressing complex challenges in sustainable organisations. Insect Biorefinery (IB) for feed and food is often promoted as a sustainable solution to upcycle nutrients from food loss and waste but faces significant challenges. Many existing IB organisations exhibit speciesism—prioritising certain species (mammals primarily) over others (insects)—while relying on one-size-fits-all solutions that overlook diverse ecological and social contexts in which they operate. This approach undermines the principles of democratic practices, which emphasise participation, representation, and respect for all stakeholders, including nonhuman entities.
This research investigates how designers can develop more inclusive business models by co-creating with multispecies agencies to pursue equitable development. The core hypothesis is that applying a speculative capabilities approach to multispecies justice can establish objectives in designing IB organisations.
Our ongoing study focuses on scaling IB within Europe, discussing (1) Black Soldier Fly capabilities in natural and artificial habitats through multispecies storytelling and (2) overlooked human situated knowledge via speculative co-fabulation.
Central contributions are:

1. Identifying multispecies and autobiographical approaches as tools for challenging speciesist narratives;
2. A framework to co-design with multispecies cultures;
3. Synthesis and ranking of competing designs for democratic IB.

KEYWORDS | MORE-THAN-HUMAN DESIGN, MULTISPECIES STORYTELLING, ETHICS OF CARE

1. Introduction

The current ecological crisis and the increased exploitation of nonhumans have generated renewed interest in studying the multiple modes of existence between humans and nonhumans. Concepts such as *Cosmopolitics* (Stengers, 2005; Latour, 2007), the P*arliament of Things* (Latour, 2005; Simons, 2017), *Correspondence* (Ingold, 2017), and *Zoocialisation* (Petitt & Brandt-Off, 2022; Coppola, 2023), among others, contributed to changing understanding of the nonhumans' social and political agency, leading scholars to move from ethical to political frameworks in thinking about the position of nonhuman animals, interspecies relations, and multispecies cultures in organisations (Meijer, 2023).

Following the ontological centering of the nonhumans, designers have increasingly reflected on expanding participation in participatory design to include the voices of nonhumans in the design process (Haldrup et al., 2022). Despite this, few studies have addressed the epistemological challenges associated with the ontological turn (Tironi & Hermansen, 2018). These studies typically follow two main strands: (1) exploring experimental tools that extend the subject condition to nonhumans and (2) examining how nonhumans contribute to the design process. This study aligns with the first research strand.

From existing interdisciplinary literature on ethical leadership, environmental geography, feminist theory and participatory design on multispecies relationality, it is clear that the extent to which non-humans contribute to the design process is related to the space given to negotiate values and goals (Braidotti, 2006; Latour, 2007; Haraway, 2008; de la Bellacasa, 2010; Howard & Melles, 2011; Monahan, 2012; Hartog, 2015; Mitten, 2018; Tironi & Hermansen, 2018; Hansson et al. 2018; Fry et al., 2022; Cusworth, 2023; Mejier, 2023; Stavropoulou et al., 2024). Within the organisation, the dimension of this space has to do with the form of leadership involved in this process and how it affects the self-concept and beliefs of others (humans) (Monahan, 2012; Hartog, 2015; Fry, 2022). Ethical leadership is a value-driven form of leadership that involves the process leader's personal, political, and professional aspects, as it has been perceived as a behavioural style in itself (Hartog, 2015).

Adopting a social influence perspective, this article considers designers' activist and mediator roles (Hansson et al., 2018) in "*speaking for the living*", accessing their knowledge and materialising it in design processes. Cultivating the ability to discern nonhuman vitality (Bennet, 2010) through prototyping (Tironi & Hermansen, 2018) and multispecies storytelling (Westerlaken, 2021), designers as activists can glimpse space of correspondence in which beings respond to one another in gestures of care and attentiveness (Ingold, 2017). Designers, as mediators, can balance human and nonhuman perspectives in their political relations mediated by technology, conceived as media in the *medianaturecultural* continuum (Braidotti, 2016).

As such, this study demonstrates the role of designers in shaping ethical leadership in the *medianaturecultural* continuum of Insect Biorefinery (IB), able to eradicate old ways of practising technological mediation and make room for new ways in which the human-nonhuman relationship is shaped to lower suffering for nonhumans.

In the following, we first reflect on (1) the ontological turn "beyond the human" in sustainability discourse, (2) the role of designers in shaping humans-nonhumans relations in technology use, and (3) the challenges of husbandry dynamics in Western metaphysics.

Next, we present an empirical analysis of ongoing Ph.D. research on establishing interspecies democracies within European IB organisations, which involves prototyping and storytelling practices.

2. Ethics and Politics in Insect Biorefinery

2.1 Sustainability and Ethics in Multispecies Context

Development is not a neutral phenomenon but is deeply intertwined with socio-political dynamics and ethical considerations. Sustainability is a contested issue in science, and it concerns what it entails for organisational and societal practice (Latour, 2004). Sustainability is a matter of creating dialogues that creatively create new practices. This involves grounding sustainability in participatory practices and inter- and intra-multiple context goals (Chabay et al., 2019; Guske et al., 2019).

Sustainability narratives play a pivotal role in shaping decision-making processes within local systems, influencing stakeholder interactions, supporting paradigm shifts, and facilitating the integration of sustainability practices into the cultural fabric of the system (Veland et al., 2018). These practices, in turn, significantly impact the sustainability performance of the local system and its broader contribution to global environmental and social well-being. The fluid and evolving nature of narratives fosters a more comprehensive understanding of sustainability, encompassing multiple perspectives that contribute to effective problem-solving in the face of complex challenges (Veland et al., 2018; Guske et al., 2019).

Indeed, narratives significantly shape human comprehension and our ability to imagine and achieve transformed futures within sustainability. Examining the variation and conflicts between sustainability narratives reveals that they are not necessarily based on evidence and precise categories but can be vague and ambiguous to be acceptable and attractive to different actors (Guske et al., 2019). This emphasises the need to critically analyse and understand the power of narratives in entrenching old ways of thought and practice and making space for new ones (Louder and Wyborn, 2020).

Sustainable Development Goals (World Commission on Environment and Development, 1987), the Triple Bottom Line (Elkington, 1997), the Planetary Boundaries Approach (Rockström et al. 2009), and the Doughnut Economy (Raworth, 2017) are some of the most prominent frameworks of sustainability narratives (Jørgensen, 2024). While these models have driven significant advances in sustainability practice, they remain limited in their ability to challenge speciesist assumptions that prioritize human interests over those of other species.

Speciesism -the discrimination against nonhuman species - poses a significant ethical challenge within sustainable development. It reflects a broader societal tendency to prioritise human interests over those of other species. In this, multispecies conflicts are ontological: they are conflicts over life itself, as they essentially challenge modes of existence (Tassinari et al., 2020; Coppola, 2023).

Addressing speciesism requires a paradigm shift in how we perceive our relationship with nonhuman, advocating for a more inclusive approach that recognises the rights and needs of all species (Otero et al., 2020; Moranta et al., 2022). The changing understanding of nonhuman animals' social and political agency and their increased exploitation have

led scholars to move from ethical to political frameworks in thinking about the position of nonhumans, interspecies relations and multispecies organisations (Mejier, 2023).

Increasing calls to re-conceptualise human relations with nonhuman agencies in the Anthropocene has sparked a range of multispecies studies seeking to de-centre humans to focus on the lives and struggles of nonhumans, outlining an engendering narrative of sustainability (Jørgensen, 2024). However, acknowledging the relationships between humans and nonhumans does not necessarily mean granting equal ethical claims to both. Fry et al. (2022) argue that while an ontological focus on the nonhuman highlights our acknowledgement of interconnectedness, it does not imply political equality. In fact, integrating nonhumans into design processes presents unresolved ethical challenges since existing interspecies design ethics place humans in an exceedingly powerful position (Parker et al., 2022).

Choosing which entities to consider in multispecies relations and how to mediate these relationships is deeply personal and political, and no existing framework can determine it. Instead, it is an ongoing negotiation, reflection, and adaptation process based on the specific modes of existence in which these relations unfold (Fry et al., 2022).

2.2 The Role of Designers as Ethical Leaders in Multispecies Organisations

While technology discourse on morality envelops on defining technologies as media without morals, which mediating roles of human-nonhuman relation depend on how they are used and how they allow unforeseen mediations to emerge; an increasing number of designers and researchers agree that design is not neutral in the world, but rather argue that design is political in shaping relations and interactions in technology use through story-making (Juul Søndergaard, 2018; McIntyre-Mills et al., 2023; Dunne & Raby, 2024).

Various scholars support this notion and argue that design, as deeply connected to designing ways of being (Papanek, 1971), can act as a poietic force, facilitating transitions towards sustainable futures forcing political obsolescence (Rancière, 2010; Dixon, 2020; Coppola, 2023). This layer is where world-making practices like design express their poietic-ability to support democratic relations and interaction in times of planetary challenges (Coppola, 2023).

Akama (2012) emphasises the potential of design to foster democratic engagement and social change, particularly in contexts marked by ecological crises. Similarly, Coulton and Lindley (2017) highlight how design practices can stimulate participatory processes that empower communities to address pressing issues. Manzini and Margolin (2017) elaborate on this by discussing how design can catalyse social innovation, enabling collaborative efforts that transcend traditional boundaries. Rezai and Erlhoff (2021) also contribute to this discourse by illustrating how design can support the development of democratic practices in various societal contexts. Finally, DiSalvo (2022) discusses that designing experimental spaces not only challenge conventional civics, but they embody *"a staging ground that help[s] visions of society take form by activating the civic imagination through making and the use of made things".*

By framing design as a contextual and transformative political act in the *medianaturecultural* continuum (Braidotti, 2016), Hansson et al. (2018) consider designer roles - intervening, interacting, mediator, and activist - as technical functions and political choices that can reinforce or disrupt the status quo. As such, designers can take responsibility for developing experimental spaces for new ways of being in the form of ethical multispecies organisation, leveraging their roles as activists and mediators in a

social influence perspective that focuses on respecting the rights of all affected parties (Gini, 1998; Den Hartog, 2015) and aims to refrain from acts that harm others (Kanungo, 2001).

As we live in a participatory universe, designers as activists and mediators can shape organisational leadership by telling themselves and others multispecies stories (McIntyre-Mills et al., 2023). Storytelling - or story-making as a spatial and material practice (Jørgensen, 2024) - entails the view of being part of nature in such a way that it embodies all the agencies involved, expanding a sense of possibility. In this sense, designers lead others in shaping this human-nonhuman relationship (Mitten, 2018), incorporating diverse worldviews and objectives in synthesising competing designs and ranking them according to a priority ordering of objectives in decision-making (Sen, 2001).

However, it must be acknowledged that *"any practice of relation involves a constitutive violence"* (Ginn, 2014). As such, it must be acknowledged that in multispecies relations, care, harm, exclusion, and hierarchy are objectives with some directions (minimise or maximise) that are possible and can be necessary (Haraway, 2008). In the current animal-industrial system, animals' productive and reproductive labour is always heterodirected, extracted, used and exchanged and has nothing productive for the ecosystem. Haraway (2008), therefore, calls for a sharing of suffering and a responsible way of killing to lower suffering for others (Timeto, 2024).

By creating spaces for negotiating values and goals, designers can shape multispecies organisational leadership - as a relationship in which some people (designers) can persuade others (i.e. humans involved in decision-making) to adopt new values, attitudes and goals (Uhl-Bien, 2006) -, not neglecting inherent relational asymmetry but aiming to lower suffering for, paying attention to, cultivating openesses and sensitivity towards others (i.e. subordinate humans and/or nonhumans) involved, their way of being and bodily experiences.

2.3 Insect Biorefinery Dynamics and Multispecies Organisations

The political considerations surrounding multispecies relations evolve, requiring ongoing dialogue and critical engagement with the diverse realities in which these relations unfold, specifically those involving livestock, farming, hunting, and animal sacrifice (Fry et al., 2022), as animal matter is considered the challenge par excellence of Western metaphysics (Salzani, 2024).

Husbandry dynamics are characterised by power imbalances, where humans exert control over nonhuman animals. Mechanisation and technological advancements in farming have created a disconnect between farmers and livestock, diminishing the traditional bond of earlier practices (Buller et al., 2020). This shift fosters a culture of anthropocentric exploitation prioritising economic efficiency (Rossi & Garner, 2014), often leading to overlooked animal pain in routine husbandry (McLennan, 2018). Furthermore, animal exploitation practices are presented as natural, as if it were normal and inevitable that all animals are treated this way as subordinate and inferior (Filippi and Leghissa, 2024).

These dynamics are no different in the context of emerging breeding technologies. IB represents a niche innovation to upcycle food loss and waste, echoing the environmental salvation narrative (Slater, 2022), presenting several (anthropocentric) advantages over

traditional livestock farming practices, such as:

- Converts feed to animal mass with up to 80% efficiency, compared to traditional livestock, which typically converts only 10% (Peer et al., 2021);
- Emits up to 80% less greenhouse gas emissions per kilogram of protein produced than traditional livestock (cattle) (Pérez-Grisales & Soto, 2022; Oonincx et al., 2010);
- Requires up to 375 times less water than traditional livestock farming, making it significantly more water-efficient (Xie et al., 2024);
- Provides a food source of high-quality protein, essential fatty acids, vitamins and minerals (Zhou et al., 2022).

Moreover, insect-based feeds for livestock and pets have been shown to improve gut health and microbiota diversity (Biasato et al., 2020) and reduce the need for antibiotic growth promoters, thus enhancing their health (Patyra & Kwiatek, 2023).

The multispecies relationship in IB is asymmetrical and hierarchical, interlinked with broader issues of resource access and utilisation (Ghosal et al., 2015; Margulies & Karanth, 2018). IB is often performed as ideological narratives in the form of strategies that provide an opportunity to address resource upcycling and human, pet, and livestock well-being (see Dicke, 2018; Chia et al., 2019; Barragán-Fonseca et al., 2020; Hawkey et al., 2021). In this context, co-producing between humans and nonhumans is predicated on acts of killing. In the IB industry, insects are primarily perceived as entities to be exploited—raised and killed—often without regard for their agency or well-being. This contrasts with earlier practices where the agency of animals—and even insects—was recognised and valued, as exemplified in classical and vernacular Chinese narrative literature on insects (see Idema, 2019).

3. Methodology

This study synthesises and ranks a set of competing designs of interspecies democracies in IB through the notion of capabilities. This notion aims to ensure that living beings have fulfilled lives that account for animals' cognitive and social lives (Nussbaum, 2011). This study applies the capability approach in the context of ongoing Ph.D. research to explore interspecies design scaling opportunities for IB as a niche innovation (Figure 1).

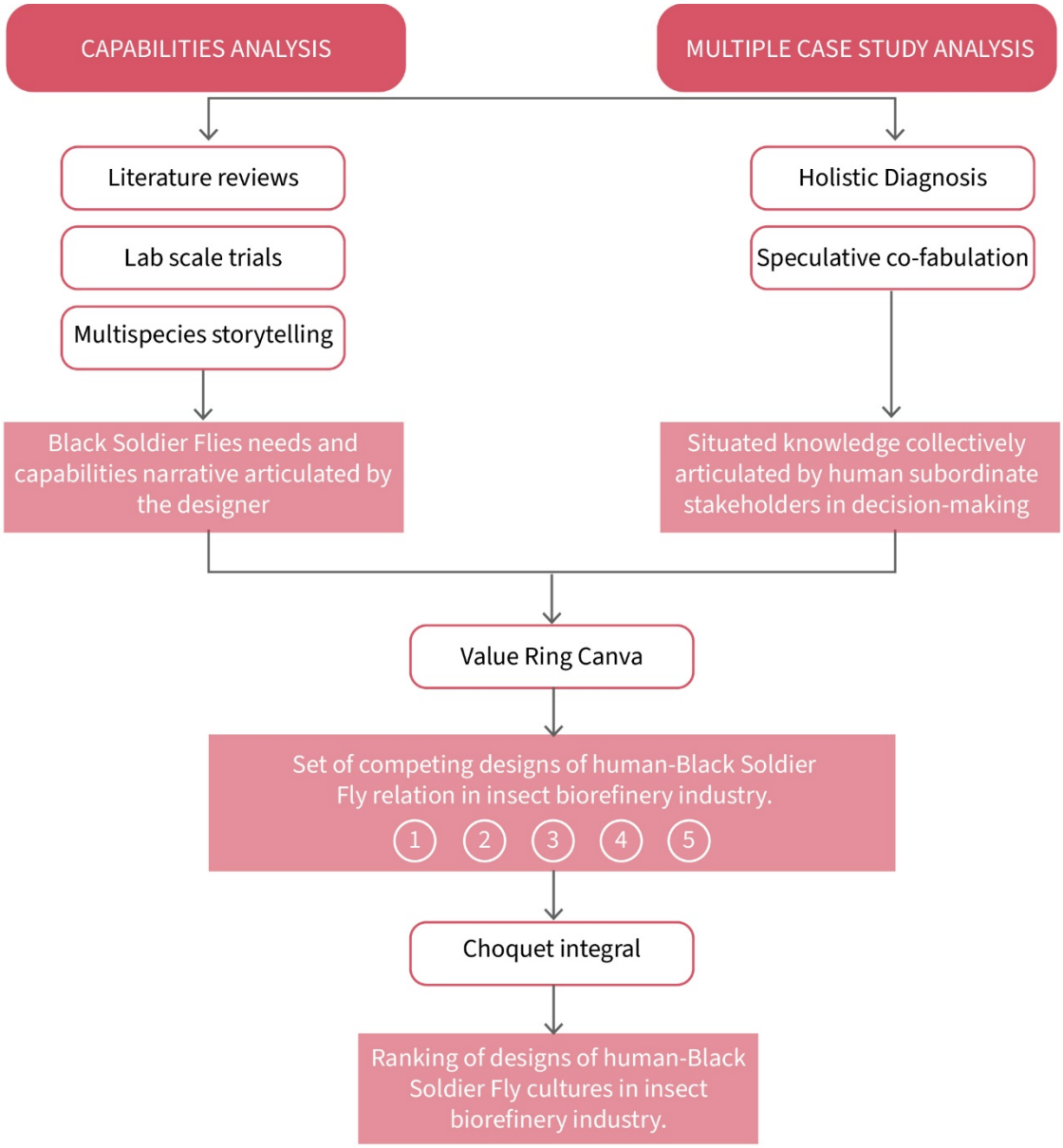

Figure 1. Research design methodology.

A capabilities approach investigates how principles of biomimicry can improve egg production in Black Soldier Flies (BSF) (Hermetia illucens) love-cages. Prototypes of artificial habitats are created in a laboratory environment (see Grosso et al., 2024). Consequently, a multispecies storytelling exercise examines the insects' needs and capacities, transforming this data into practical insights such as:

- Narratives for BSF that designers can advocate for in design projects;
- Requirements, performance metrics, and guidelines for constructing love-cages to allow BSF adults to express their capabilities fully.

The research analyses multiple cases, focusing on the interaction between IB sector and local contexts in Italy and Belgium. The primary aim is to develop a protocol that integrates nonhumans and autobiographical approaches (e.g., multispecies storytelling and speculative co-fabulation; see Padula, 2024) with established systems mapping methods (e.g., Holistic Diagnosis; Pereno & Barbero, 2020). This integration seeks to access and incorporate (human) situated knowledge and nonhuman narratives into the systemic design, advancing its ontological and epistemological commitment to pluralism (Vink, 2023; Meijer, 2023).

The designer employs an updated version of the Value Ring Canvas (Fernandes et al., 2018) as a mediating tool to converge BSF's needs and perspectives with (human) situated knowledge, collectively articulated by local stakeholders during a speculative co-fabulation process (see Padula & Barbero, 2023
), synthesising a set of designs (i.e., value logics) of human-BSF cultures in IB sector.

Finally, according to a decision tree analysis, the Choquet integral analysis (Bottero and Ferretti, 2011) allows for multicriteria assessment and ranking of the value logic from local stakeholders and experts (Figure 2). This method assigns weight to every possible set of criteria - including environmental, entrepreneurial ecosystem, socio-cultural, and economic dimensions - and computes a weighted average of the values of all the subsets. While the framework does not include a specific criterion for animal welfare, this reflects the intent to avoid reinforcing dualisms between human and nonhuman objectives (Latour, 2010).

For the higher level of the hierarchy (the criteria level), the evaluation of the criteria's importance refers to a political sphere and does not reflect strict objective and technical knowledge and thus involves local stakeholders. For the lower levels of the hierarchy (the attributes level), the evaluation has been performed by individual experts in their proper field of expertise. Local stakeholders and experts involved in the multicriteria assessment were informed about the post-anthropocentric approach adopted in the study, clarifying the meaning of each criterion, subcriterion and attribute.

This paper presents the capabilities approach results, focusing on the Italian unit of analysis.

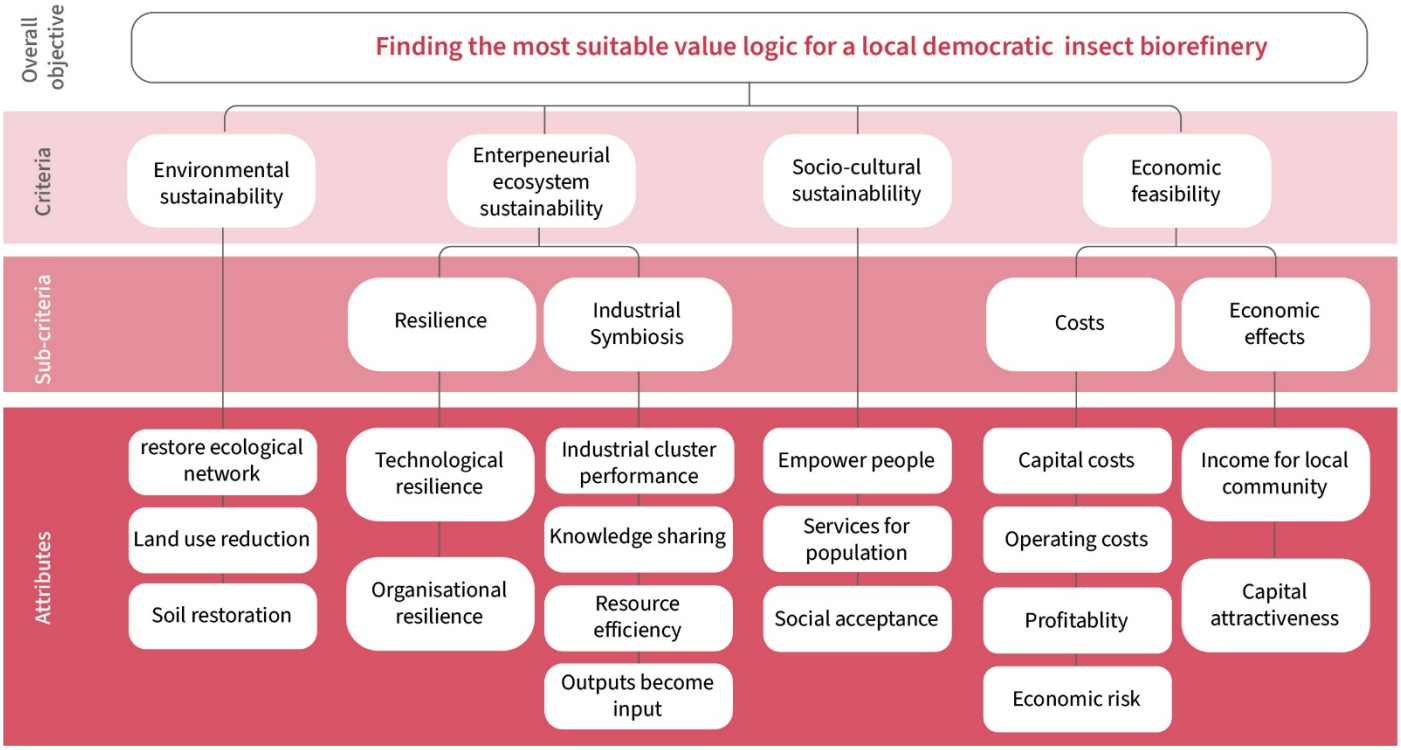

Figure 2. The decision model for the analysis involving 18 indicators clustered in four main criteria: environmental, entrepreneurial ecosystem, socio-cultural and economic aspects. Specific definitions have been assigned to each attribute, sub-criteria and criteria.

4. Results

The results section presents findings in three parts using tables and stories:

- Section 4.1 collects an array of BSF adults' capabilities, offering a baseline for future design in BSF love-cages;
- Section 4.2 presents an excerpt of the multispecies storytelling exercise conducted with BSF adults to prototype a place of correspondence;
- Section 4.3 reports the co-designed value logics as possible human-nonhuman relations in IB beyond current narrative,s and the ranking results from Choquet integral analysis.

4.1 Capabilities of Black Solider Flies: Insights from Multispecies Storytelling

This section describes the capabilities of BSF adults both in natural and artificial habitats as a baseline for future design. Following Parker et al. (2022), Table 1 classifies various capabilities relevant to BSFs and provides definitions and examples for each.

The BSF is a holometabolous insect, so during its life cycle, it performs complete metamorphoses. It passes through larval stages that are very different from the adult form, followed by a quiescent form (pupa), and finally reaches the adult stage. The different forms of the insect show obvious differences, which are not only related to morphology but also to physiology, different feeding habits, and general vital needs (Bonelli et al., 2019). The scope of this study is about the adult stage.

Adult *H. illucens* is about 16 millimetres long, mostly black with metallic blue or green on the thorax and a reddish end of the abdomen, with the second abdominal tergite having translucent zones. *H. illucens* is very similar in size, colour, and appearance to the organ pipe mud dauber wasp and its relatives, making it a mimic fly. The antennae of the fly (Pezzi et al., 2017) are elongated and wasp-like, and its hind tarsi are pale, similar to the wasp's. BSF larvae can be distinguished from those of the blowfly or housefly by a thin grey-black stripe on their posterior ends (ITIS, 2009).

In a natural setting, a female *H. illucens* lays between 500 to 1000 eggs at a time, usually deposited in crevices or on surfaces near decaying matter such as manure or compost (Georgescu et al., 2022). Significant variations are observed between natural and artificial settings: artificial conditions can lead to increased fecundity, with some females laying more than 1,000 eggs (Chia et al., 2018). In addition, traps/egg collectors of different shapes and materials are used in an industrial environment (Booth & Sheppard, 1984; Boaru et al., 2022).

Manipulating breeding environments can impact population dynamics. Several studies have focused on environmental conditions in love-cage as humidity (Holmes et al., 2012), temperature range (Chia et al., 2018), type of light, its photoperiod, and its colour temperature (Liu et al., 2022), and oviposition site preference (Booth & Sheppard, 1984; Julita et al., 2021). Other research reported as BSF reproduction was impacted by adult density and its sex-ratio (Hoc et al., 2019), fly age and size (Jones et al., 2021; Lemke et al., 2024), feeding of adults (Nakamura et al., 2016; Romano et al., 2020), and larval diet (Gobbi et al., 2013; Laursen et al., 2024).

Table 1. Capabilities of Black Soldier Flies (BSFs) adults in natural and artificial habitats.

Capabilities (Design targets)	Definition	Examples

Health	Live a normal length of life, in good health and free from bodily intrusion or violence, with opportunities to develop a full range of senses.	
Rest	Choose favourable resting sites.	Access to perching and resting areas within the enclosure that mimic natural preferences, such as branches or shaded areas.
Feed	Practice typical foraging strategies and choose food.	Access to suitable, diverse food sources such as decaying organic matter or specific substrates that allow for natural foraging behaviors.
Bathe	Access water to drink, clean self, or regulate body temperature.	Access to moisture sources or damp areas for drinking, grooming, and hydration maintenance.
Play	Access sources of pleasure, enjoy recreational activities, or have adequate sensory stimulation.	Providing varied textures and objects within the cage for exploration or sensory engagement.
Autonomy	Make own decisions and have freedom of movement.	
Move	Choose when and where to fly.	Sufficient open space within the enclosure for BSFs to fly freely, take off, and land at will.
Fledge	Access adequate structures to land on and gain independence.	Floating surfaces or landing platforms designed to allow BSFs to hatch after surfacing.
Disperse	Disperse into adequate territories and establish own range.	Large aviary space with minimal overcrowding to allow territorial settlement and space utilisation.
Defend	Defend territory.	Space within the love-cage to engage in behaviors associated with territoriality.
Affiliation	Form rewarding relationships with others and have choice of attachement to others.	
Socialise	Have connections with conspecifics of others.	Group rearing conditions that allow for natural social behaviors, such as aggregation or clustering.
Learn	Develop local knowledge and expertise based on interactions with conspecifics or others.	Situations in which flies can observe and mimic behaviors, especially in resource-locating or environmental navigation.
Mate	Find potential mates, court, and mate.	Availability of both male and female BSFs within the same enclosure to enable courtship and mating behaviors.
Egg deposit	Access potential deposit sites to incubate eggs.	Dedicated, accessible locations such as egg traps or organic substrates for females to lay and incubate eggs.

4.2 Story-making with flies

This section presents an excerpt of the multispecies storytelling exercise.

When discussing possibilities for engaging with animals, Deleuze argues for flies as surface animals, *lesser creatures,* that, through their apparent simplicity, provide a thought-provoking perspective for examining the intersections of human, technological, and non-human agencies (Filippi, 2024).

Our storytelling with BSF adults begins in the fall of 2022. We travel to BEF Biosystems' laboratory plant to commence our storytelling by engaging bodily with BSFs (Figure 3). It continues in the spring and summer of 2023 and 2024 in the pilot plant love-cage of 24 m³ in Casalnoceto, Alessandria, Italy (Figure 4).

Figure 3. The lab scale love-cages (0,3 m³).

> "Entering the aviary room, I am enveloped by a persistent hum, a chorus of wings brushing the air. The four corners of the structure reveal a sterile environment, illuminated by blue lights, and unwholesome (at least for me, a human). The humidity and the heat a heat pump produces make me breathing heavy, compounded by the flies' stench.
>
> I close the door. I sweat, calm my heartbeat, and kneel near a wall. We open the aviaries. BSFs do not naturally swarm, so it takes some time before they exit the cages and spread across the room. Their distribution is not uniform; they cover short distances, arranging themselves mid-air and on resting surfaces. Do they perceive their confinement as I do?

Before long, dozens of individuals land on me. They are small and show no fear of my presence, so much so that I could easily catch them if I wanted to. Do they perceive my warmth, my smell? Do they think I smell bad as I think they do? Do they recognise me as a valid or invalid surface to land on while waiting to mate?

And so, I watch them dance, their circular flights and sudden directional changes transforming the room into a stage—or rather, into a blue-lit courtship arena where all the males' energy is focused on competing for the females' attention." Field diary, November 16, 2022

Figure 4. The industrial-scale love-cage (24 m^3), showcasing the lighting systems and environmental enrichment elements. A researcher inside the cage provides a sense of scale, highlighting the anthropometric relationship. Behind the scenes of the photo-reportage Millenium Bugs by Luigi Avantaggiato, 2024.

This story about BSF adults does not aim to provide definitive answers but rather to raise questions about the relationships among species, technology, and designed environments.

In trials conducted in spring 2023, the environmental enrichment encouraged more significant egg deposition, leading us to believe this was due to a reduction in male competition and, consequently, a greater focus of energy on mating (Grosso et al., 2024) (Figure 4). The design choices, such as increasing resting surface area and creating shaded zones, appear to have encouraged the flies' natural behaviours, shaping a place of correspondence where the designer accesses and engages with the BSF culture.

But what does this mean for the flies in the organisation? What opportunities exist for designers who engage with flies to design responsible human-fly relations?

4.3 Emerging Value Logics for Multispecies Culture in Insect Biorefinery

Table 2 presents a set of competing designs of humans-BSF cultures as value logics in different relationship types, resulting from the Italian unit of analysis. The design process considered captivity and liminal BSF life conditions.

Today, artificial environments are essential to ensure optimal conditions for the survival of BSFs in the European climatic zone throughout the year. Indeed, during the winter, BSFs diapause, which corresponds to the slowing down of their metabolism until the environmental conditions (temperature and humidity) become favourable again (Ferdousi and Sultana, 2021). However, some modelling studies suggest that, following climate change, the suitability of the habitat for BSF would progressively increase in continents with high latitudes, such as North America, Europe and Asia, especially around the 40° N parallel by 2050 (Pazmiño-Palomino et al., 2022). This suggests that, in the near future, human-BSF relationships may develop beyond that of captivity in the European climatic zone.

Results from the Choquet integral (Table 3) report that the most desirable alternative is N°2, followed by N°5, N°1, N°3, and N°4. Hence, there is a reluctance to use alternatives that foresee the use of insect breeding products in the feed and food sector, whether they involve killing insects or not. This finding aligns with studies suggesting that ethical concerns and cultural acceptability significantly influence the perception of insect-based products in both human and animal diets (Delvendahl et al., 2022).

Conversely, the preference for breeding activities focused on soil restoration and recreational or educational initiatives suggests a societal inclination towards applications that align with environmental sustainability and non-intrusive practices respecting insect lifespans. These trends are consistent with emerging literature emphasising the increasing value of biodiversity conservation and non-harmful interactions with nature in agriculture systems (Sultana, 2021; Mejier, 2023; Fry et al., 2022; Nelson et al., 2024).

Finally, the economic feasibility criterion is not relevant. This may be because we are talking about hypothetical scenarios in which the concreteness of economic feasibility fades. This finding resonates with the broader discourse on sustainability transitions, where non-economic values increasingly shape farmers' decision-making processes (Maréchal, 2018; Hayden et al., 2021).

Table 2. Human-Black Soldier Fly (BSF) cultures and their potential impact on BSF capabilities in captivity relationship. Definitions of human-nonhuman relationships are given.

N°	Relationship	Examples of human-BSF cultures (value logic)	Possible impact on capabilities
	Captive	Captive refers to animals that live among, depend on, or are confined by humans. Captivity provides some health benefits but risks diminishing the BSF's ability to exercise autonomy or maintain affiliation with the colony.	
1	Labour	Human urban farming users contribute their by-products and organic waste free of charge to the operators. These are then processed and used as a diet for BSF larvae. The larvae are then raised until they reach optimal size and	BSFs do not live a normal length of life. Enclosure reduces autonomy.

	harvested to be used as high-protein feed for poultry in urban farming systems. Finally, frass is repurposed as high-quality organic fertiliser in the urban farm.	
2 Labour	A temporary BSF greenhouse is set up in contaminated soil to cultivate Black Soldier Flies (BSF). Organic by-products such as agricultural residues, food waste, and plant material are deposited inside the greenhouse. The BSF larvae feed on these waste materials, decomposing them and converting them into nutrients that benefit the soil. This decomposition process enriches the soil with essential nutrients. After a defined period, necessary for the restoration, the service provider dismantles the greenhouse.	Enclosure reduces autonomy. BSFs live a normal length of life. However, the colony has a limited lifespan.
3 Labour	In BSF greenhouses, BSFs are housed in environments replicating their natural habitat by incorporating native plants and vegetation. These settings allow the flies to freely exhibit their natural behaviours, interact with plant species. Egg traps are placed within the environment to collect eggs. The larvae are fed organic food by-products, such as food waste or agricultural residues. Once the larvae are fattened, they are utilised as animal feed. Finally, frass is repurposed as fertiliser.	BSFs experience autonomy interacting with plant species. They do not live a normal length of life. The absence of other animal species may limit the full expression of their ecological roles.
4 Resource	In specially designed aviaries, similar to butterfly greenhouses, BSFs are housed in environments replicating their natural habitat by incorporating native plants and vegetation. These settings allow the flies to freely exhibit their natural behaviours, interact with plant species, and choose their preferred sites for egg deposition. Humans collect BSF exoskeletons (exuviae) to extract chitin and chitosan for several purposes in the food sector, such as improving vegetable product shelf-life and soil properties and inducing plant growth.	Collecting exoskeletons does not involve hunting, so BSFs live autonomous, full-length lives, interacting with plant species. However, enclosure reduces autonomy. The absence of other animal species may limit the full expression of their ecological roles.
Liminal	Liminal refers to animals that live in human settlements but do not necessarily affiliate with or depend on humans. Compared to captive BSF, liminal insects have greater autonomy.	
5 Entertainment	In a natural reserve, humans keep BSFs for entertainment and educational purposes. In a forested area, a netted enclosure is set up. Here, BSFs coexist with various specific other native animal and plant species.	Enclosure reduces autonomy. BSFs live a normal length of life, interacting with plant and animal species.

Table 3. Overall, Choquet integral results. The table indicates the weighted average of the

values of all the subsets (attributes, sub-criteria, criteria) in the decision tree model for each value logic (N°). The detailed attributes for each sub-criteria are shown in Figure 2.

Criteria	Sub-criteria	Attr.	N° 1		N° 2		N° 3		N° 4		N° 5		
Environmental Sustainability (E.S.)		E.S. 1	0,5		0,75		0,75		1		1		
		E.S. 2	0,75	4,00	0,25	7,25	1	7,75	0,75	6,50	0,5	7,25	
		ES. 3	0,5	40,00	1	72,50	0,5	77,50	0,25	65,00	0,75	72,50	
Entrepreneurial Ecosystem Sustainability	Resilience (R.)	R. 1	0,75		0,75		1		0,75		0,25		
		R. 2	1	9,50	0,5	6,50	0,5	8,00	1	9,50	1	8,50	
	Industrial Symbiosis (I.S.)	I.S. 1	0,25		1		0,75		0,5		0,25		
		I.S. 2	0,75	8,00	0,75	8,50	1	8,50	0,5	5,75	0,75	8,00	
		I.S. 3	1		1		1		1		1		
		I.S. 4	1	90,50	0,5	75,00	0,5	82,50	0,25	83,75	1	83,50	
Sociocultural Sustainability (S.c.)		S.C. 1	1		0,25		0		0,25		1		
		S.C. 2	1	9,75	1	9,25	0,25	4,00	0	4,25	1	9,50	
		S.C. 3	0,75	97,50	1	92,50	0,5	40,00	0,5	42,50	0,75	95,00	
Economic Feasibility	Costs (C.)	C. 1	1		0,5		0,25		0,25		0,75		
		C. 2	0,5	2,00	0,75	7,75	0,75	7,00	0,75	7,25	0,75	5,50	
		C. 3	0		1		1		1		0,25		
		C. 4	0,25	34,00	0,5	89,75	0,25	70,00	0,5	66,25	0,75	62,00	
	Economic Effects (E.E.)	E. E. 1	0,5		0,75		0,5		0		0,75		
		E.E. 2	0,25	4,00	1	9,50	0,75	7,00	1	6,00	0,25	6,50	
				743,005		861,725		706,875		675,625		809,54	

5. Conclusion

By prioritising speculative methods and feminist critiques, this study contributes to breaking the "ontological blindness" often present in systemic design (Vink, 2023).

By "*becoming fly*", the designer accesses BSFs' lived experiences and cultural needs,

transforming these insights into actionable objectives within IB organisations. This approach extends the subject condition to BSF adults, allowing their perspectives to be heard and translated into objectives within the human-BSF relationship in IB.

This empirical analysis shows us that within the European IB sector, it is possible to create at least a multi-species relationship that reduces the suffering of the nonhuman, albeit characterised by an imbalance of power, typical of the captive condition, aimed at the productive imperative. Integrating multispecies perspectives into the design process offers a pathway toward reimagining IB organisations as more inclusive and democratic entities overcoming the "insects for food and feed" paradigm. However, this experience risks being one of those irrelevant experiences that narrowly escapes the mechanisms of violence, where ethics become entrenched.

In this study, the designer does not "*speak for*" the BSFs in a value logics co-design setting with human stakeholders. Instead, the BSF objectives are systematised alongside human objectives through the updated Value Ring Canvas. This tool enables the designer to prioritise certain objectives based on personal values (Hartog, 2015) and synthesise them into a set of competing designs that strive to challenge the anthropocentrism and asymmetry characterising current IB organisational relationships. Future research could investigate how human participants in co-design workshops perceive and negotiate nonhuman objectives when the designer's leadership advocates for them. This could provide insights into the dynamics of multispecies decision-making and the extent to which human stakeholders are willing to adapt their priorities to accommodate nonhuman objectives.

Moreover, an important factor that may have influenced the successful definition of at least one human-BSF culture that reduces nonhuman suffering is the gender of the designer-leader. The designer author of this study is a woman. Women are often more predisposed to "*becoming other*" and establishing relationships rooted in care and attentiveness (Mitten, 2018). This indicates that further research could explore how designers of different genders contribute to developing multispecies leadership in organisations.

Finally, this research adopts a social influence perspective on leadership. Further research could examine (1) how different approaches to ethical leadership -i.e. social learning, social exchange, purpose-based, and altruism approaches-, (2) or other related forms of leadership- i.e. transformational, transactional, spiritual, authentic and paternalistic- (Hartog, 2015) and (3) or designers behavioural styles shape power dynamics, decision-making, and the integration of nonhuman needs within the design of multispecies organisations.

Nevertheless, achieving truly equitable and sustainable multispecies futures requires fundamentally rethinking the structures and values underpinning IB systems, alongside continuous efforts to navigate the ethical and political tensions inherent in multispecies relationships.

As such, this study reinforces the importance of grounding designers' education in feminist studies and the philosophy of technology (Levick-Parkin et al., 2024). Speculative methods can encourage designers to transcend the ontological blindness in technology mediation of specific industrial contexts, specifically livestock and farming. However, foundational ethics and positionality issues must be equally important in design practice and curricula to realise their transformative potential. It is essential for designers to meaningfully engage with critical questions, such as "what kind" of futures we are designing and "whose futures" are being considered in designing multispecies relations.

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DESIGNING CHANGE: DESIGN FOR WOMEN EMPOWERMENT

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ABSTRACT | This study investigates how design functions as a transformative agent for female empowerment, with a focus on initiatives in fashion, craftsmanship, and digital and social entrepreneurship.
Based on a cross-cultural perspective, the research examines how design-oriented projects can address systemic gender-based disparities and facilitate economic and social autonomy for women.
Design is able not only to challenge existing gender inequalities but also to create inclusive environments and job opportunities.
It can allows women access to resources, professional development and a better work-life balance.

The research methodology combines literature review, case study analysis. The conclusions focus on definition of actionable practices based on research-action projects.
The literature review establishes a theoretical framework by synthesizing previous studies on gender equity, design theory, and empowerment.
The aim is to outline how design can influence female agency.
Grounding the study in the field of social design and gendered spaces, the literature review tries to dissect the mechanisms through which design can function as a vehicle for social change.

It identifies recurring themes, such as the economic opportunities related to the access to creative and digital tools, the preservation of cultural heritage through craftsmanship, and the capacity of design to influence policy for gender equality.

The case study analysis centres on specific projects across various cultural contexts that demonstrate how women in different parts of the world use design to reshape their lives and communities.
The selection of case studies, as wide as possible, considered also different design fields from craft-oriented projects to digital platforms.
Additionally, social and creative entrepreneurship examples illustrate how design-led initiatives in underserved areas create new spaces for women's professional growth and leadership within communities.
These cases highlight design's role in creating gender-inclusive spaces, fostering collaborative networks, and enhancing skill development.

To obtain useful indications in the practice of design, the research adopts an action research methodology, aimed at identifying effective formats able to implement projects focused on women's empowerment.
This approach included the analysis of participatory design methodologies that involve women as co-creators and stakeholders.
This practice makes project outcomes consistent with community needs and culturally relevant.
The use of iterative methods include continuous feedback loops, action research. This methodology produce models adaptable to real contexts, aimed to empower women.
This approach considers women not only as beneficiaries of project actions but as active agents in the participation process. It gives them power through participation and development of new models of leadership.

The results highlight the ability of design to influence global development agendas, advancing the Sustainable Development Goals as gender equality, economic empowerment and social inclusion.
Integrating woman-oriented design principles into decision-making processes, the paper highlights that design can go beyond aesthetic and functional aspects and become a strategic tool of social transformation.
This study contributes demonstrates that design can be a driver for inclusion requests and promote empowerment at a socio-economic level.
The findings highlight the transformative potential of design to redefine gender norms and contribute to the creation of a more equitable and inclusive society.

KEYWORDS |
DESIGN, WOMAN EMPOWERMENT, CRAFTMANSHIP, LOCAL DEVELOPMENT

1. Introduction and research context

Design has emerged as a transformative agent in empowering women in recent years. It is an influential tool that enables the shaping of societal values, behaviours, and experiences displayed in products, services, digital solutions and architectural spaces. Design has the potential to foster social change, including the advancement of gender equity.

> Women and girls are half of the world's population and hold half of the world's human potential. The benefits accrue across society when their lives are improved (Beloskar, Haldar and Gupta, 2024).

In recent years Design is garnering interest from scholars, practitioners and activists alike as they recognize the potential of Design as a contributor and promoter of women empowerment. The ability of Design to address the unique challenges that women face—ranging from access to healthcare and education to safety and economic independence—positions it as a critical mechanism in achieving gender justice.

> Women's empowerment remains a core concern globally. It is broadly defined as the ability of "women to control their lives and make decisions that affect their well-being" (Forbes, 2023).

Gender inequality continues to exist notwithstanding the progress in various areas. Design can therefore, provide an alternative in bridging gaps in resources, knowledge, and opportunities, for women to thrive and overcome systemic barriers. This paper explores the intersection of design and women's empowerment by examining theoretical frameworks, key principles, and case studies where Design has been successfully employed to create tangible change for women.

Woman empowerment in Design also refers to the Sustainable Development Goal 5 "Gender Equality". SDG 5: Gender Equality states that gender equality is not only a fundamental human right, but is a necessary requirement for a peaceful, prosperous and sustainable world, although gender inequality, especially for women, persists throughout the world, with the denial of fundamental rights and opportunities.

Design Discipline can support Goal 5 through the creation of products and services based on innovative and cooperative business models, which enhance the specific skills of the participants in their creation both at the design and artisanal level and the enhancement of cultural heritage.

This activity contributes to enhance the opportunities offered by greater social interaction, community engagement, active participation in decision-making processes and emancipation within the reference context.

2. Paper structure

The paper is made up of three macro sections: a bibliographical review of the literature on gender issues and design disciplines, taking into consideration

concepts such as feminism, patriarchy/matriarchy relationship, inequalities and capitalist models, justice and social change, empowerment and female liberation, male and female leadership models, participatory design dynamics, explored by significant authors in the field of design research such as Place, Costanza-Chock, Noel, Manzini, Sanders.
From this investigation emerge some directions of deepening and development of innovative projects that concern the different areas of design ranging from fashion and product design to communication and service design.
In the second section, some case studies are analyzed related to real projects that have seen design as a tool for female emancipation in different contexts both in the global north and in the global south selected both for the quality of the results and for the use of structured methodologies and processes. These cases are related to different design fields, starting from product design and craftmanship to design thinking tools, service design and digital platforms. The case studies choice was made in order to involve diverse design areas that are more relevant in different geographical contexts.
The third section analyzes design tools and methodologies developed with the aim of promoting female empowerment through the creation of innovative and participatory business models capable of enhancing the talents and potential of participants and creating opportunities for training, access to resources, professional development and economic independence. The conclusions show how these projects can contribute to the creation of positive models of female leadership in the field of design, to the creation of replicable project formats that can also inspire public policies capable of redefining gender norms and creating a more inclusive and equal society.

3. Literature review

A systematic and comprehensive literature review of existing scholarship on the intersection of Design and gender equality was conducted. The intersection of design and women's empowerment has gained increasing attention in feminist scholarship, design research, and policy discourse. Traditionally perceived as a technical or aesthetic discipline, design is now recognized and acknowledged as a powerful tool for social transformation, particularly when informed by feminist principles.

> "Feminist design theory, for example, interrogates how traditional design practices have often excluded women's perspectives or reinforced patriarchal structures" (Burgin, 2019).

> "Critical feminist perspectives argue that the design process is inherently gendered and often marginalises women's voices, particularly in industries such as technology and urban planning" (Schneider, 2020).

> "Feminist scholars challenge these exclusions by advocating for inclusive, participatory design practices prioritising the needs and experiences of women at the forefront of the design process to empower them" (Bayat, 2018).

3.1. Feminist Critiques of Traditional Design

> "Traditional design practices often reflect and reproduce male-dominated norms. Design history reveals the voices and experiences of women were largely ignored, relegating them primarily as users and not creators or decision-makers"(Burgin, 2019),.

> "Gendered assumptions are evident and embedded in urban planning, product design, and technological development, where male norms often serve as the default" (Schneider, 2020).

It is these biases that the feminist design theory critiques by foregrounding the structural inequalities that shape the process and outcomes of design.

3.2. Feminist Design Approaches

> "Feminist scholars and practitioners champion participatory, inclusive design methodologies that place women's lived experiences at the centre" (Bayat, 2018).

These approaches challenge hierarchical, top-down models and instead emphasise co-creation, empathy, and local knowledge. Place (2023) introduces the notion of "doing feminism through design," highlighting how feminist values, such as care, inclusivity, and justice, can be embedded into design as both process and product. Feminist design therefore becomes not only a method of activism and creation, but also a core contributor to broader goals of gender equity.

3.3. Design Thinking: A Tool for Empowerment

Design thinking is widely viewed and emerged as a problem-solving methodology identified by its user-centered research, ideation, prototyping, and iterative testing. While it originated in business and engineering, its application in social innovation has proven especially impactful. Brown (2009) and Brown & Wyatt (2010) emphasise empathy as a core component of design thinking, making it a natural ally to feminist practice. When applied with a gender-conscious lens, design thinking can help develop innovative solutions to address systemic barriers women face, such as access to healthcare, mobility, digital inclusion, and economic opportunities.

Case Example:

> "The design of SheSafe, in India is an example of a mobile application co-created with women from urban slums, that allowed users to access emergency services and report incidents of harassment. The app's development followed an iterative design thinking model that centred user feedback, demonstrating how digital design can tangibly improve women's autonomy and safety "(Deshmukh, 2017).

3.4. Empowerment Through Leadership and Systems Design

Empowerment through design extends beyond individual experiences to institutional transformation. As Chamorro-Premuzic (2020) notes, design-led interventions can facilitate the rise of women in leadership, particularly by disrupting traditional male-dominated authority figures and role models. Woman empowerment through design can also drive women to apical positions in organisations, redefining leadership models, shifting from a narcissist male leadership to a feminine transformational leadership paradigm.

> "Transformational leaders excel at translating a vision into a concrete plan for change and serve as strong role models for their subordinates" (Chamorro-Premuzic, T. 2020).

Women in transformational leadership roles, are characterised by vision, empathy, collective decision-making and align with values embedded in inclusive design allowing women empowerment but also contributing to broader organisational effectiveness and social sustainability.

While much of the existing literature emphasises the importance of gender-inclusive design practices, it is the emphasis on the role of implementation that will yield results: the need for action rather than just deliberation. Sampathkumar, (2015, citing Solberg) argues that there are gaps in understanding how these approaches can be systematically implemented in different sectors, from product design to urban planning and digital development.

3.5. Gaps in Practical and Methodological Integration in Current Research

The growing body of literature may be advocating for feminist and gender-inclusive design, however significant gaps persist in practical implementation and methodological integration. Most existing research emphasises conceptual and theoretical frameworks but often lacks:

3.5.1. Transdisciplinary Integration:

Many studies remain confined within disciplinary silos—design, gender studies, urban planning, or policy—without integrating methodologies across fields.

> "There is a lack of hybrid methods that combine qualitative feminist research (e.g., ethnography, narrative inquiry) with design research tools (e.g., prototyping, systems mapping) to generate actionable outcomes" (Sampathkumar, 2015).

3.5.2. Evaluation and Impact Metrics:

The literature rarely provides systematic tools for measuring the impact of design interventions on women's empowerment.

> "Existing studies often stop at the design stage without longitudinal tracking or frameworks to evaluate outcomes at individual, community, and policy levels" (Bayat, 2018).

3.5.3. Contextual Adaptability:

> "Many frameworks are developed in Western contexts and lack adaptation to diverse cultural, socioeconomic, and geopolitical environments, where gender norms and power dynamics differ significantly. There is a need for localised design research that is culturally sensitive and grounded in participatory co-creation" (Schneider, 2020).

3.5.4. Policy Linkages and Institutional Adoption:

> "While design can inform empowerment, few studies explore how feminist design strategies can be institutionalised within governmental, educational, or corporate systems. The disconnect between grassroots participatory design and top-down policy frameworks leaves a major gap in scalability and policy translation" (Place, 2023).

3.5.5. Technology and Digital Inclusion:

> "Although digital tools are increasingly used in empowerment efforts, designing inclusive tech—especially for marginalised women—is underexplored. Issues of algorithmic bias, access, and digital literacy are seldom addressed with integrated feminist design approaches" (Deshmukh, 2017).

This paper brings to focus solutions adopted and applied through design interventions to bridge this gap by providing a comprehensive framework for applying design to women's empowerment by reviewing case studies.
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4. Theoretical framework: Empowerment through Design

This section will first define the concept of empowerment within the context of this paper to enable a better understanding on how Design can empower women.

> "Empowerment is a multidimensional concept that encompasses psychological, economic, social, and political dimensions" (Narayan, 2005).

Rappaport (1981, 1984) posits that empowerment is a “construct that links individual strengths and competencies…to social policy and social change” (Perkins and Zimmerman 1995, citing Rapapport).

> “Thus suggesting that the basic components of the construct are collaborative participation towards achievement of goals , gaining access to resources and understanding of socio political environment” (Perkins and Zimmerman, 1995).

> “Therefore empowerment-oriented interventions for participants not only improve wellness but also aim to ameliorate problems, enable skill and knowledge building opportunities and engage professionals as collaborators as opposed to “authoritative experts” “(Perkins and Zimmerman, 1995).

In the context of Design, empowerment can be viewed as the process by which design practices facilitate women’s ability to act independently, make informed decisions, and access opportunities previously restricted by societal norms or structural inequalities.

> “Women empowerment and its advancement through design in recent years has been approached through the analytical lens of feminist design theory and critique. It emphasises inclusivity and recognises women as agents of change that should actively participate in the design process” (Margolin, 2010).

The ubiquitous quality of Design permeates much of our realities thus immensely impacting our lived experiences, yet very few of us participate in design processes. Constanza-Chock posits that

> "the people most adversely affected by design decisions pertaining to visual culture, new technologies, the planning of communities, or structure of political and economic systems, tend to have the least influence" on the making of decisions that impact them (Costanza-Chock 2018).

Therefore, assimilating feminist principles into Design, allows practitioners to create solutions that challenge traditional gender roles and dismantle power structures.

> “The concept of participatory Design also plays a central role in this theoretical framework. Participatory Design incorporates user engagement —especially the marginalised or underrepresented groups— in co-creating solutions” (Schuler & Namioka, 1993).

For women’s empowerment, this approach ensures that women’s lived experiences inform the design process, leading to products, services, or environments that genuinely address their needs.

> “A growing field within Social Design is Design justice. It emphasises the importance of centering marginalised communities in design processes through its principles and argues that Design should prioritise equity and social justice by challenging systems of oppression and amplifying voices that have been historically silenced “(Costanza-Chock, 2020).

The framework of Design justice thus not only enables and advocates designs focused on disrupting gendered power dynamics but attempts to promote gender equity. This further promotes social and economic autonomy for women upholding women's empowerment objectives.

> "Social design projects are seen as tools for empowerment, developing creative skills, fostering civic leadership and encouraging wide participation in public life from all society sectors. However, there is still a significant gap in addressing underlying assumptions and biases within design, such as gender norms and power structures, which need explicit discussion to foster a critical perspective of empowerment in design" (Mazé 2019).

> "Emancipation, liberation and abolition can be also used to guide the design process. Sometimes we make progress through incremental change; other times we need to be more radical and abolish systems altogether, and that is where these principles can guide the design process. Reform and incremental change are both an approach to change that is built on tweaking older designs and systems." (Noel, 2023)

5. Case Studies

5.1. Selection methodology

When selecting cases of women empowerment through design, a strategic and multi-dimensional approach ensure the relevance, diversity, and analytical depth of the study.
Cases covering multiple design disciplines, but not just limited to graphic design, product design, fashion design, service design, and digital interaction design is the first criteria. In order to completely understand of how different areas of design can serve as vehicles for empowerment a board coverage is required. The second key criteria is that the geographical diversity is prioritized, it highlights the varied socio-economic, cultural and political contexts which leads to design empowerment. The analysis can be better captured by the influence of local challenges and opportunities on the success of initiatives which incorporates cases from diverse regions.
Third, the focus is on cases of social entrepreneurship with high levels of social impact. This focus on projects that go beyond profit generation to actively address systemic gender inequalities, contribute to community development, and foster long-term social change. A strong emphasis is placed on participatory processes, where women are not merely beneficiaries but leaders: active co-creators and decision-makers.
Additionally, to make sure the structured design methodology is employed which are human-centric design, co-design or design thinking that ensures methodological rigor and replicability. These use of such specific design tools and techniques such as identity cards, stakeholder mapping, and user journey analysis served as a proof of systematic and reflective design process.
By applying these criteria's, the objective of the study is to construct a representative and meaningful narrative of cases that lightened the intersections between design, gender empowerment, and social innovation. These selected cases are an example of both analytical exemplars and sources of transferable knowledge, which in return contributes to a deeper knowledge of how design practices can be utilized to promote gender equity in different global contexts.

5.2. Analysis: Case Studies and Applications

This section presents several case studies from across the world of design solutions that have successfully empowered women across various domains. Thus, this illustrates where Design has been used as a tool for change and the power of Design in advancing women's empowerment.

Fig 1. She for she Pad kit: empowering though product design source: https://www.sheforshepads.com/menstrual-kits/

5.2.1 Product Design: SHE Innovation Kit(https://www.sheforshepads.com/menstrual-kits/)

The SHE Innovation Kit, a set of low-cost, reusable sanitary pads, is an example of how Design can address critical barriers to women's health and economic participation. Designed with input from women in rural regions, the SHE Kit provides an affordable and sustainable solution to menstrual hygiene management, a key factor that limits many women's ability to attend school or work. The design process involved women with a considered and focused view on the cultural and practical constraints they face, the SHE Kit has significantly impacted women's health and economic independence, thus demonstrating the potential for product design to empower women in marginalized communities.

Fig 2. The Anou cooperative, showcasing Amazigh weaving practices source: www.theanou.com

5.2.2 Product Design: Amazigh (Marocco www.theanou.com)

Dina Benbrahim's work with Amazigh women weavers in Morocco is an example of the transformative role of design in processes of female empowerment. These women, often excluded from society due to colonial and patriarchal dynamics, use the practice of weaving to express a feminist narrative and preserve their cultural identity. The carpets they make use ancestral symbols such as the Tanit triangle, a sign of resistance and resilience within a conservative society. Despite systemic exploitation, initiatives like the Anou platform support fair trade and creative freedom. Benbrahim underscores the need for pluralistic design histories that validate marginalized women's contributions, leveraging design as a tool for social justice and inclusive futures.

Fig 3. Design Possível team and women group source: Julia Asche

5.2.3 Product Design: Design Possível (Brazil www.designpossivel.org)

Rede Design Possível, a São Paulo-based non-profit founded in 2004, empowers vulnerable groups, particularly women, through design and solidarity economy initiatives. It provides training, market access, and support to artisans and seamstresses to develop and commercialize accessories, clothes and toys to foster economic independence and sustainability. Design Possível incorporates design with social objectives to allow the network address gender inequality and promote community integration by collaborating with universities to enhance innovation and entrepreneurship. To reinforce women autonomy and socioeconomic impact over 250 beneficiaries have gained skills and income with solidarity economy models and technology expansion plans in the future.

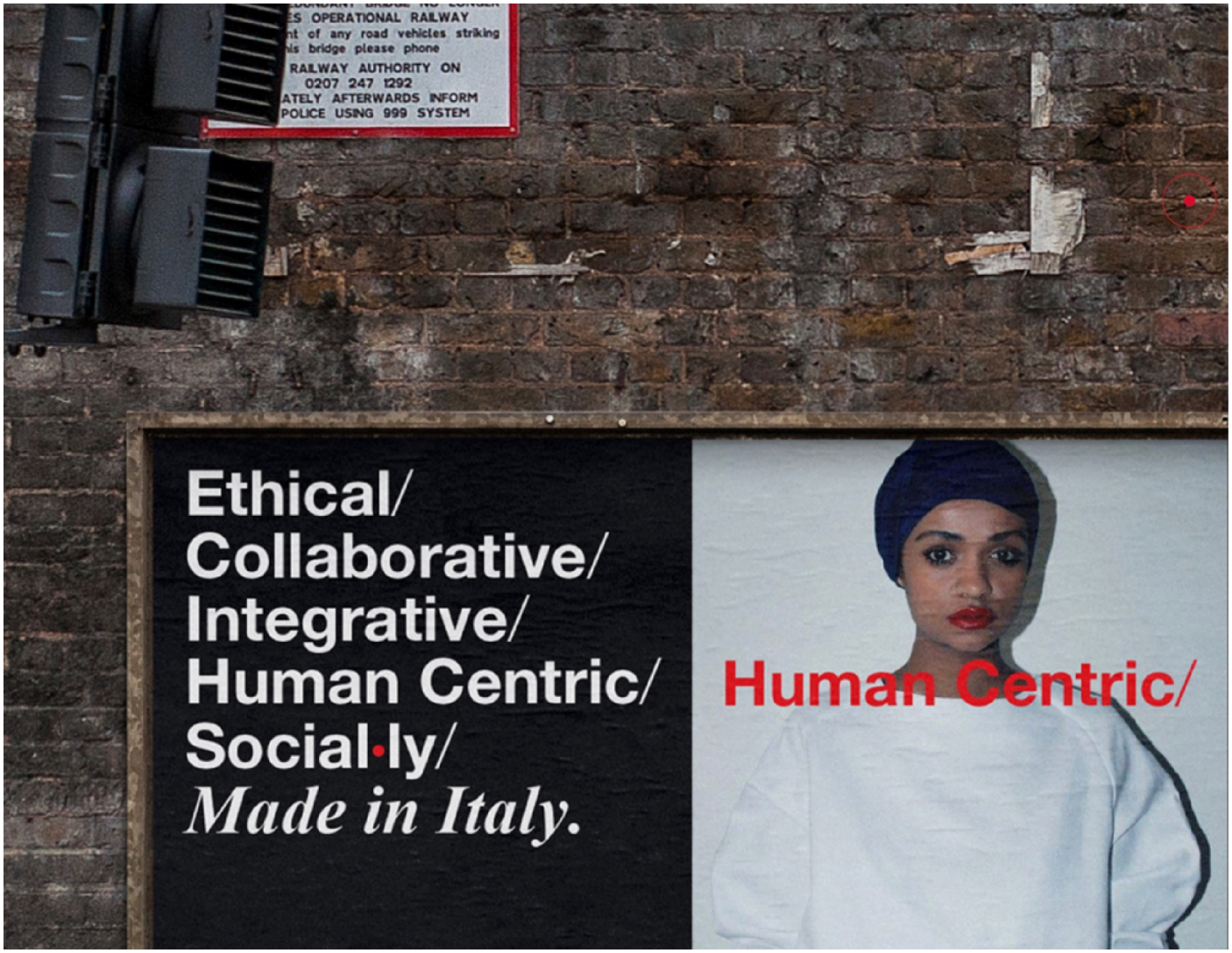

Fig 4.Promotional poster from Cooperativa Alice, an Italian social enterprise combining fashion design with social rehabilitation and ethical craftsmanship.source: www.cooperativalice.it

5.2.4 Fashion Design: Cooperativa Alice (Italy, www.cooperativalice.it)

Cooperativa Alice works with a mission to construct an inclusive society, by supporting sustainable development through craftsmanship and ethical supply chains. Established in 1992, Alice restores centrality of the person, fights prejudice and rehabilitates through fair wages. It is committed to protecting the traditions of "made in Italy" and encourages individuals and companies to develop sustainable lifestyles.

Within the women's sections of the Lombard prisons a trade is taught to help preserve and spread the Italian know-how. This then allows the inmates to return to being active subjects and assume a positive role in the local economy. Alice has enabled achievement of economic independence to more than 450 marginalized women. (https://www.opesfund.eu/restart-italia/cooperativa-alice/)

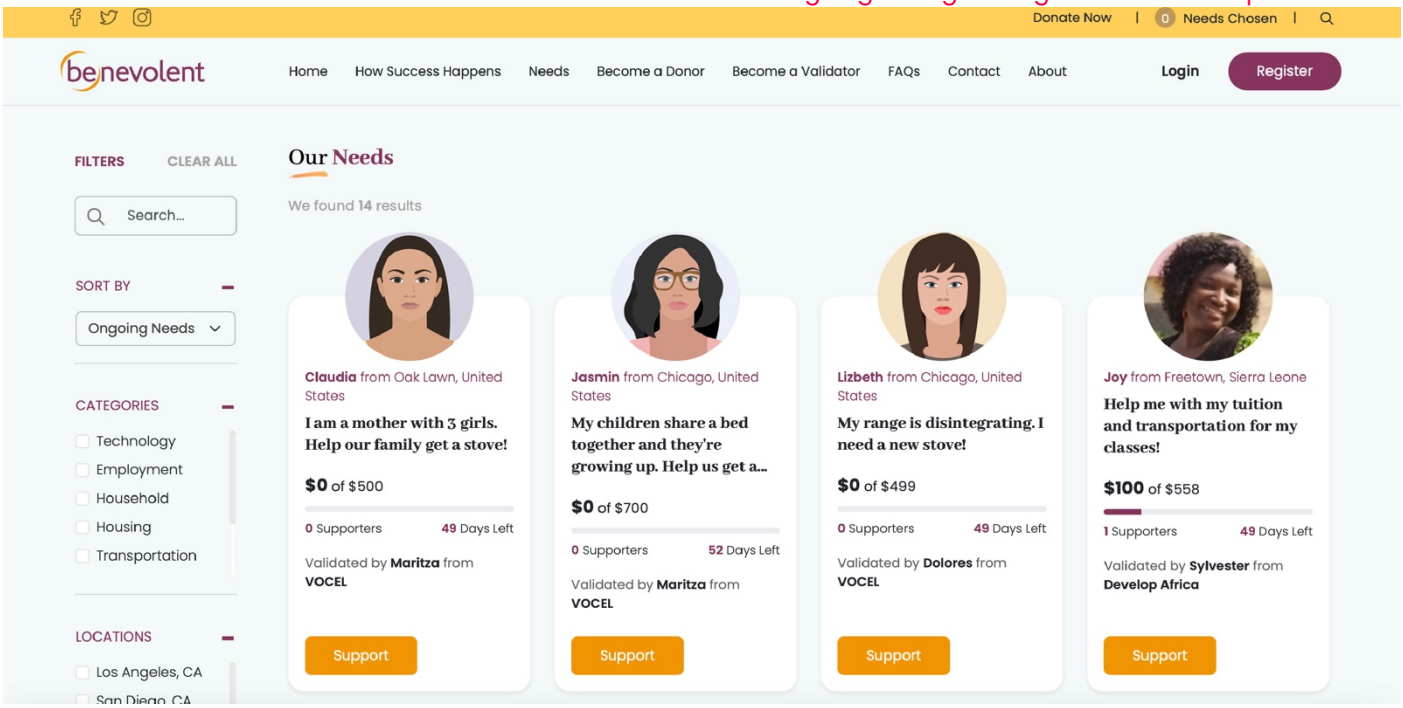

Fig 5. Interface of the Benevolent platform, which facilitates need-based crowdfunding to support women's empowerment through accessible digital design. source: https://portal.benevolent.net/needs/search

5.2.5 Digital Design: Women-Led Digital Platforms (Global, https://benevolent.net/about/our-team/)

Benevolent, is a digital platform founded by a woman that is an example of leveraging design to empower women through micro-donations and crowdfunding. Benevolent allows women (and men) to post specific needs—whether for education, health, or business resources—and receive financial support from donors. Simplicity, accessibility, and security the core design features of the platform make it user friendly for women from diverse backgrounds. Thus, this meets immediate needs and builds a sense of community and self-efficacy, crucial components of empowerment.

Fig 6. Interior view of The Wing, a women-centered co-working space in the USA designed to foster professional collaboration and community. source: https://www.instagram.com/the.wing/

5.2.6 Spatial Design: The Wing (USA)

The Wing, is a co-working space designed for women and represents how when spatial Design provides a safe and supportive environment for professional and personal growth for women it can empower them. Designed with women's needs in mind the Wing offers spaces where women can collaborate, share resources, and network. It offers additional facilities such as childcare and community spaces enabling women to thrive in professional settings that historically have been male-dominated. The Wing, thus fosters both individual and collective empowerment.

Fig 7. Arohan, Aavishkaar Group's microfinance initiative, utilizes mobile technology and design thinking to improve financial inclusion for rural women in India. source: Aavishkaar Social Report

5.2.7 Design Thinking: Aavishkaar (India, https://aavishkaargroup.com/group-companies/arohan/)

Aavishkaar's Arohan is a microfinance initiative that used design thinking to create mobile financial services aimed at helping rural women gain access to credit. By designing an intuitive mobile platform that works in local languages and is tailored to the digital literacy levels of rural women, Aavishkaar has empowered thousands to start businesses, invest in education, and improve their livelihoods.

Fig 8. Gender+ Puzzle Tool by Chroma Collective and IDEO.org, designed to integrate intersectionality into development programs. source: https://www.ideo.org/perspective/a-playful-tool-to-design-more-gender-inclusive-programs

5.2.8 Design Thinking: Chroma Collective and Ideo Gender + Puzzle Tool (Global https://www.ideo.org/perspective/a-playful-tool-to-design-more-gender-inclusive-programs)

Gender+Puzzle is a Design Tool created by the Chroma Collective (a group of gender practitioners) in collaboration with Ideo in order to integrate gender+ intersectionality across multiple levels of a development program. It helps program teams visualize the overlapping identities of those in their target population. The goal is to create a snapshot of a person's life that represents their composite identities and intensity of each identity. The Tool is composed of cubes and cards. Each cube represents a facet of who they are —be it religion, race/ethnicity, class, disability, etc—and practitioners can choose how intense is the presence of that identity in the community interested by the program.

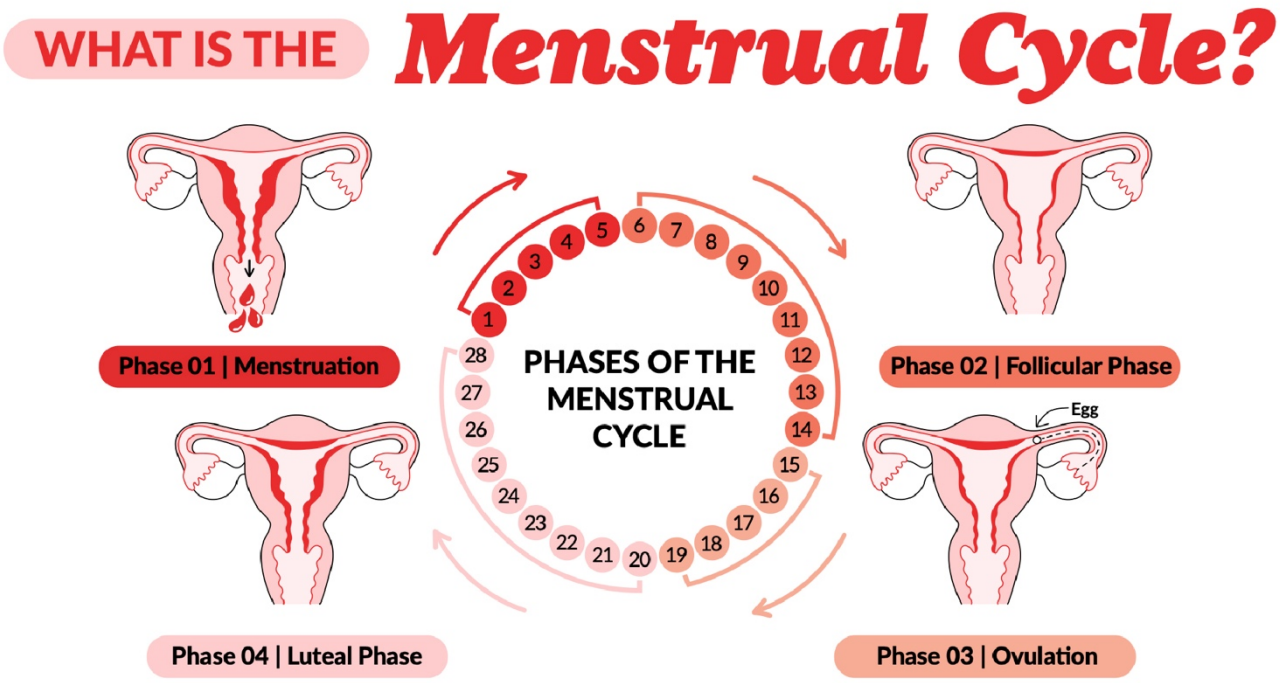

Fig 9. Period menstrual cycle: empowering through communication design source: https://period.org

5.2.9 Communication Design: PERIOD. (USA, https://period.org):

Period, is a nonprofit organization that advocates for systemic change through policy and legislation to remove the stigma around menstruation. They provide educational resources and distribute menstrual products free to communities in need. Design-driven visuals and outreach support their campaigns. PERIOD is a youth-powered movement. It has notably shifted societal attitudes towards menstrual health, recognizing it as a matter of human rights. Thus, sparking systemic and policy changes in local governments and schools. In the state of Uttarakhand, in Northern India, The Sidhast Foundation runs a similar program working on eradicating period stigma in collaboration with local regional organizations (Pandey and Pande 2022).

Fig 10. Women for Women International's programs in Rwanda empower women through economic and social support post-genocide. source: Rwanda, https://www.womenforwomen.org/where-we-work/rwanda

5.2.10 Service Design: Women for Women International (Rwanda, https://www.womenforwomen.org/where-we-work/rwanda)

Designing for women's safety is critical, particularly in refugee camps attempting to provide safe refuge to violated and displaced women. Women for Women International is an organization in Rwanda established to train women to advocate for their rights, in the aftermath of the genocide against the Tutsi in 1994. It enables women to use their economic and social power to change the status quo in their communities (women for women International). Their initiatives have created safety and security designed to provide comfort, economic security and access to resources. They offer diverse services and skills empowering women to rebuild their lives in the face of crisis.

Fig 11. Piano C's initiatives in Milan support female empowerment through coaching, training, and career counseling. source: www.pianoc.it

5.2.11 Service Design: Piano C (Italy, www.pianoc.it)

Piano C is a Milan based organization that promotes female empowerment through coaching, training, career counseling and female entrepreneurship consultancy. It uses the "Work Design" method, based on design thinking practices, aimed at reinventing work spaces and schedules to align them with the needs of participants. Piano C structured an ecosystem to support women with career and care needs, based on the integration of professional coaching and skills development workshops. This approach is based on collaboration, flexibility and creativity and allows women to break down systemic barriers and create paths to economic independence, creating inclusive and sustainable work dynamics.

N°	Project name	Design area	Design method/ tool applied	Female participation or leading role	Empowering effect
1	SHE Innovation Kit	Product Design	Participatory product development,	Participation on the product co-design process	Social inclusion
2	Amazigh	Product Design	Participatory product development, Fair Trade training	Participation on the organizational business structure, participation on the product co-design process	Economic independence, organisational capacity, leadership development
3	Design Possível	Product Design	Design Possível Social Technology:	Participation on the organizational	Economic independence,

			Participatory product development and cooperative production processes organizational training	business structure, participation on the product co-design process development of entrepreneurship mindset	organisational capacity, entrepreneurship, leadership development
4	Cooperativa Alice	Fashion Design	Participatory product development, Fair Trade training, Fashion Design technical training	Participation on the organizational structure of the business, participation on the product co-design process, development of entrepreneurship mindset	Economic independence, organisational capacity, technical skills emprovment
5	Women-Led Digital Platforms	Digital Design	Crowdfounding campaign development	Self promotion	Economic independence, organisational capacity, virtual community building
6	The Wing	Spatial Design	Business model design (BMC)	Development of entrepreneurship mindset, community leadership	Networking, community building
7	Aavishkaar	Design Thinking	Design thinking, digital service development, business model design	Development of entrepreneurship mindset, community leadership	Economic independence, organisational capacity, entrepreneurship
8	Chroma Collective and Ideo Gender + Puzzle Tool	Design Thinking	Chroma Collective cubes and cards	Community leadership	Community engagement, leadership
9	PERIOD	Communication Design	Design-driven visuals and data visualization	Participation on the communication co-design process	Social inclusion,
10	Women for Women International	Service Design	Technical and soft skills empowering methods	Development of entrepreneurship mindset	Economic independence, resilience
11	Piano C	Service Design	“Work Design” method: Coaching, training, career counseling, female entrepreneurship consultancy	Development of entrepreneurship mindset	Organisational capacity, entrepreneurship

5.3. Case analysis, tools and methodologies

Women's empowerment is a transversal theme that can be integrated across all design disciplines, from product design to service design and design thinking. Analysed case studies and projects from both Global North and Global South contexts highlight common themes despite differing socio-economic environments.

5.2.12 Roles and identities

Key aspects that emerged include recognition and valorization of women's identities and multifaceted roles, in the family and in the community. The need to reconcile worker and caregiver role require new organizational models based on an efficient time management and work-life balance.
It is possible to work visually on the feminine identity in product design processes (such as in Amazihg carpet production) valorizing feminist narratives and preserving the cultural identity of an ancestral matriarchal society translating their symbols into contemporary design products.
In the field of communication design the Period association is an example of how communication design can be used to promote campaigns about a complex aspect of feminine life the delicate subject of menstrual poverty.
In the field of design thinking the tool Gender + Puzzle, developed by Ideo and Chroma Collective insert the intersectionality concept and the valorization of multifaced woman identities into the structuration of sustainable development design driven programs.

5.2.13 Economic independence and work-life balance

The creation of new design driven economic activities is addressed to promote economic independence and facilitate work-life balance. This fact can redefine womens role inside families and communities, in an empowerment process. Maternity and caregiving responsibilities are factors that distance women from the possibility of having a fulltime work activity causing economic dependence on the male members of the family and a consequent unbalanced power relation. Economic independence is the main factor of women's emancipation and can be achieved through the creation of cooperatives and startups related to both manufacturing activities and creative jobs in the field of services and communication. These new companies often offer better working conditions in terms of work life balance such as working from home or having a more flexible time management.
Microfinance initiative such as Aavishkaar's Arohan in India and career coaching programs such as Piano C help women to redefine their career paths to structure new businesses with more sustainable conditions.

5.2.14 New business models and leadership approaches

Women and caregivers are driving the creation of sustainable business models and innovative leadership approaches. Many initiatives such as Brazilian solidary economy cooperatives, Italian social cooperatives such as Cooperativa Alice, Fair Trade initiatives such as Anou in Marocco created business with different organizational and leadership models: horizontal, participatory and community oriented.

5.2.15 New funding models

Some of the analysed case studies, such as Benevolent platform and Aavishkaar are representing new funding models, such as crowdfunding and fair trade, to support small-scale and micro-entrepreneurial ventures.
These initiatives represented, women belonging to disadvantaged categories, and allowed the possibility of accessing non-traditional forms of credit, which helped them to create their own business.

5.2.16 Creativity and business

Creativity and craftsmanship emerge as a central topic related to design oriented business innovation, involving on the one side the valorisation of traditional manual and artisanal skills but also new digital and entrepreneurial skills.
Radical creativity allows the generation of new innovative businesses, services and entrepreneurial activities, starting from local materials, a specific artisanal skill or a professional competence that becomes a service.

5.2.17 Skills development

The case studies also revealed that development of hard and soft skills, spanning artisanal expertise to organizational and managerial competencies, is a key point of the initiatives. Programs focus on training, coaching, and education all vital for equipping women with design, managerial, and entrepreneurial skills.

Design thus emerges as a powerful tool for social innovation, supporting women as agents of change and fostering sustainable economic and social ecosystems.

6. Design interventions for Women's Empowerment

6.1. Design methods/design tools, toolkits

Through the comparative analysis we underlined different areas of design methodologies and participatory processes:

- Collaborative Product Design Development

- Business Design, Strategic and Organizational Design
- Design thinking and innovation strategies
- Service Design
- Community design and community engagement
- Technical training related to craft abilities

The comparative table evidence that in most of the case different areas are present and relevant for the project development, mainly the Community Design aspect and the Business, Strategic and Organizational Design.
The main role of design is promoting the development of new community based, collaborative business models.

N°	Project name	Collaborative Product Design Development	Business Design, Strategic and Organizational Design	Design thinking and innovation strategies	Service Design	Community design and community engagement	Technical training related to craft abilities
1	SHE Innovation Kit	x					
2	Amazigh	x	x			x	X
3	Design Possível	x	x			x	x
4	Cooperativa Alice	x	x			x	x
5	Women-Led Digital Platforms				x		
6	The Wing		x				
7	Aavishkaar		x	x	x		
8	Chroma Collective and Ideo Gender + Puzzle Tool			x		x	
9	PERIOD					x	
10	Women for Women International		x	x			x
11	Piano C		x	x		x	

Many of the analyzed cases developed specific tools and toolkits in order to codesign development programs, new businesses, new products aiding in redefining production and income-generation models.

Ideo with the Gender + Puzzle is a structured creative co-design tool that use design thinking methodologies, starting from the personas, in order to consider the multiplicity of social roles and positions that users have in a community.
Design Possível developed a specific approach for working with solidary economy groups and cooperatives that have been patented as social technology. Social technology is defined by Social Technology Institute29 (ITS) as

> "a set of techniques, transformative methodologies, developed and/or applied in interaction with the population and appropriated by it, that allows representation of solutions for social inclusion and improvement of living conditions" (ITS, 2004, p.130).

The goal of this technology is to build up new entrepreneurial activities driven by women in the field of solidary economy, sustainable and social design.
Piano C, in a completely different context, developed the "Work Design" method, in order to promote professional redesign paths, combining design thinking, storytelling and empowerment techniques.
These paths and tools referred to completely different contexts and situations but have a common goal, the empowerment of women, disadvantaged or not, in a working dimension.

6.2. Women's leadership roles in projects

In the analysed cases, women are taking part in the projects as 'beneficiaries' and 'participants', but also in many cases they play a leadership role such as initiating the project, organizing the team, leading the design process and facilitating community change, and analysed how they lead.
In most of the analysed cases one of the most important role of woman leading the projects is the "**community leader**" or the "**community organizer**", regarding local but also virtual communities.
The community dimension in cooperative businesses such as Amazig, Design Possível or Cooperativa Alice is also leading with more horizontal organizational models that have many advantages such as the mutual help dimension and competences exchange.
More innovative business models such as The Wing, Piano C, Aavishkaar, Benevolent are also community based, considering community both in a physical sense but also as virtual networks. Networking, sharing working spaces, facilitating access to financial opportunities are some of the positive aspects of the organization and promotion of community-based projects impacting woman life that are in many cases characterized by the isolation into familiar houses with the role of mother and caregiver.

6.3. Cross-cultural comparative analyses

The article provides a wealth of case studies, coming from different geographical, social, cultural and productive contexts.

With the perspective of a cross-cultural comparative analysis, we can notice that in emerging context, such as India, Brazil, Rwanda, Marocco the woman empowerment initiatives and business are related to the manufacturing/artisanal/productive sector involving specific technical product design competences but also strategical and organizational skills.
In different contexts such as U.S (The Wing) and Italy (Piano C) woman empowerment is more related to career development in more digital and dematerialized activities, related to the field of service design and business strategy.
In both contexts one important aspect is the "peer learning" process and skills development that involve both design, technical and organizational skills.

7. Challenges and Opportunities in Design for Women's Empowerment

Design has immense potential to foster women's empowerment as is revealed in the case studies however much is yet to be done as several challenges still remain. These include systemic biases in the design process, lack of representation of women in design fields, and financial barriers to developing women-focused initiatives. Cultural and societal resistance to empowering women through Design can pose significant hurdles in certain regions. However, these challenges also present opportunities for innovation. Increasing awareness of gender inequity in Design, combined with the rise of women-led design initiatives and organizations, offers a promising path forward. Technological advancements, particularly in the fields of AI and wearable tech, present new avenues for designing solutions that address women's health, safety, and economic empowerment.

8. Conclusions

Women have significantly influenced ethical leadership and decision-making in purpose-led entrepreneurial projects. In the creation of purpose-driven business initiatives women developed a meaningful form of ethical leadership.
Their emphasis on empathy, dignity, inclusivity, integrity, sustainability and commitment to purpose and social impact, fosters ethical decision-making that benefits not only the enterprise but also society at large. Encouraging more women in leadership positions can help shape a more responsible and value-driven entrepreneurial ecosystem.
Design thus holds immense potential for advancing women's empowerment, especially when applied through inclusive, participatory, and socially conscious frameworks. Feminist principles, participatory design methodologies, and design justice into practice collectively can enable designers to create solutions for the unique needs of women and promote gender equity. Using case studies, this paper illustrates ways in which Design can transcend traditional boundaries to provide tangible solutions to challenges faced by women globally. In the future also, it is crucial that designers continue to prioritise women's voices in the design process, ensuring that empowerment remains at the heart of design practices.

Entrepreneurial activities driven by woman to solve women's needs are caring new leadership models that shift from the narcissistic, egoistic male leadership model toward a more empathetic feminine leadership.
Male leaders with a high emotional quotient and the majority of women demonstrate a marked possession of a leadership style that is defined as transformational. The leader who is characterized by this style focuses more on changing the attitudes and beliefs of followers and seeks to engage them on a more emotional level rather than telling them what to do…transformational leaders excel at translating a vision into a concrete plan for change and are strong role models for their subordinates and followers. Good leaders must be equipped with intellectual capital.

> "Much of the research in organizational psychology suggests that individuals who are most effective as leaders have broad and deep connections within and outside the organization" (Chamorro-Premuzic 2020).

Shifting to a feminine transformational empathic leadership model can create woman driven organizations where all the stakeholders can experiment a better participation, work-life balance and vision sharing.
Globally, companies led by women are only 33%, which drops to 15% if we take into account innovative startups founded by women (Gran Thomton Belgium global analysis 2024).
Thus, new design driven entrepreneurial initiatives can represent an inversion of this trend both in the global north and in the global south, changing perspectives, organizational and leadership models.

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DESIGNING COMMUNITY ENGAGEMENT FOR ETHICAL LEADERSHIP

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ABSTRACT | In today's data-driven world, data literacy — the ability to read, analyze, and interpret data — is an essential skill across all sectors. However, the ways in which individuals and communities engage with data are influenced by cultural values and attitudes toward privacy. The project "Designing Data X Cultures", conducted by Köln International School of Design (KISD) and Texas State University (TXST) sought to explore these dynamics from an intercultural perspective by bringing together students to investigate how different cultural contexts shape the use of data.

Through interdisciplinary collaboration, students investigated the data life cycle and developed design concepts to enhance data awareness in their communities. Virtual discussions revealed cultural differences with the aim to not only raise awareness but to generate digital and analogue design interventions promoting greater data transparency and ethical engagement within international communities.
The findings emphasize the role of design in addressing challenges related to data awareness, especially in times of artificial intelligence. This approach not only prepares designers for leadership roles but also fosters a culture of inclusivity and innovation at both local and global scales. We invite conference participants to engage and explore strategies for conducting reflective intercultural learning scenarios in design education.

KEYWORDS | INTERCULTURAL, DATA, INNOVATION, COMMUNITY, LEADERSHIP

1.Introduction

Data literacy, "the ability to collect, manage, evaluate, and apply data, in a critical manner" (Ridsdale et al., 2015) has become a crucial competency, not just for individuals, but also for leaders and entrepreneurs who design, implement, and manage data systems (see Altman et al. 2020). As data increasingly influences decision-making across sectors, the ability to read, interpret, and ethically apply data is no longer a specialized skill — it is a foundational necessity. Ethical leadership in this space is critical to ensuring that data use aligns with societal values, particularly regarding privacy, transparency, and equity. In an age where data is often equated with power, understanding its lifecycle — from collection to analysis and application — is essential for responsible decision-making (see Okorie et al., 2024). Entrepreneurs, especially, face the challenge of balancing innovation with the ethical implications of data use, striving to respect individual rights while fostering social value. As Rhea Alexander argues, entrepreneurs must not only harness the power of data to drive innovation but also use design thinking to ensure that their solutions are ethically sound and aligned with the needs and values of the communities they serve (see Alexander, 2020). Cultural norms and values play a significant role in shaping perceptions of what is considered ethical, particularly regarding data use. Different societies prioritize issues like data privacy, consent, and the moral implications of data analysis and application to varying degrees which have implications for all sectors (see Bakare et al. 2024). For example, in Europe, data privacy and protection are central tenets of the General Data Protection Regulation (GDPR). The GDPR should empower individuals by granting them greater control over their personal data and providing rights such as access, rectification, erasure, and the ability to object to data processing. It has influenced how people interact with data in their daily lives, especially on digital, commercial, and social media platforms (see Strycharz et al. 2020, Schmitt et al. 2024). Moreover, the regulation has heightened awareness of data protection rules and rights among EU citizens, fostering a stronger culture of accountability and transparency in data use (see Marikyan et al., 2024, FRA 2020).

This perspective aligns with the United Nations' *2020 Report on Data Ethics*, which underscores the global imperative to safeguard individual rights in an interconnected world. The report advocates for privacy, security, and transparency as fundamental rights in the digital age, influencing global frameworks that inform the practices of designers as entrepreneurs (see UN, 2020).

Designers in particular work extensively with data in their daily practice. They collect and transform data into information that shapes communication, while designing products and interfaces to manage, organize or generate new data. However, despite the increasing importance of data literacy, these competencies are often only implicitly embedded within

curricula and are rarely addressed explicitly or comprehensively (see Schüller et al, 2021, Ridsdale et al., 2015).

This paper explores how design projects can foster critical and conscious engagement with data literacy in diverse cultural contexts, contributing to the creation of data-aware products and artifacts. In the project “Designing Data X Cultures” students from Köln International School of Design and Texas State University (TXST) deal with the subject of data literacy from an intercultural perspective. This project aims to deepen the understanding of how cultural contexts shape data perceptions and practices. Through an interdisciplinary approach, students engaged with the entire data lifecycle, collecting, and analyzing data on topics of local significance in Cologne and Austin.

Issues such as digital privacy, mental health, and community dynamics were explored, reflecting the unique concerns of these communities. This analysis culminated in the development of both analog and digital prototypes to address ethical challenges posed by data in diverse cultural settings.

2. Project Description and Key Questions

The “Designing Data X Cultures” project took place for the first time in the summer term 2024 and was instructed as a six-week hybrid learning setting. Twelve bachelor and master students with an international background participated from KISD and eighteen bachelor students from TXST. Students from the US and Germany worked together virtually during the project using Zoom for meetings and the Miro digital whiteboard for collaboration. The social learning environment KISDspaces was also used for communication and exchange.

The project was initiated by a first weekend kick-off online meeting between TXST and KISD. At this initial meeting, the students got to know each other, and groups were formed for the entire duration of the project. As the seven-hour time difference meant that it was not always possible for the students from both locations to work together, the groups were divided into local sub-groups. These local sub-groups – of three to four students – worked on their ideas together starting during kick-off. The online meetings between TXST and KISD were used for joint presentations and feedback on the ideas and concepts of each local groups.

Figure 1: Student groups at KISD and TXST and lectures during a virtual meeting at 6 pm CET

During multiple virtual meetings students explored cultural differences between the USA and Europe, focusing on how these differences affect data use and data awareness. Key questions that emerged from the discussions regarding cultural perspectives on data ethics include:

- **How can design contribute to resolving cultural tensions surrounding data privacy while maintaining ethical standards in data collection and usage?**
  The United Nations 2020 report on data ethics emphasizes that ethical data practices must be grounded in universal principles such as privacy, security, and transparency. Designers must create systems that respect these standards while being adaptable to the specific needs and cultural values of the communities they serve. By aligning with global human rights frameworks, design can help bridge cultural divides surrounding data privacy (UN, 2020).

- **What strategies can designers employ to ensure that data practices respect cultural**

differences and promote inclusivity in global contexts?
Manuel Lima, in *The New Designer*, highlights that design must go beyond technical solutions to become a force for cultural sensitivity and inclusivity. Designers can achieve this by embracing cultural diversity in their processes, using empathy to understand the social and ethical implications of data in varying cultural contexts. Lima's view encourages designers to create solutions that are not only effective but also resonate across different global communities (Lima, 2021).

- **How can ethical leadership in design foster trust and promote transparency within communities that may have divergent cultural perspectives on data privacy?**
  Samuel W. Franklin, in *The Cult of Creativity*, critiques the modern "cult" of creativity that often prioritizes innovation over ethical considerations. He argues that ethical leadership in design should counterbalance the sometimes-unchecked drive for novelty by focusing on transparent practices and societal responsibility. For designers working with data across diverse cultural perspectives, Franklin stresses the importance of fostering trust through accountable, transparent leadership that ensures ethical standards are met (Franklin, 2020).

3. Outcomes

Students engaged in collecting and researching data on a wide range of topics that were not only relevant to their local communities but also revealed the varied cultural approaches to data interpretation. These topics spanned diverse areas, including:

- **Payment Methods**: The contrast between cash and digital payment systems, exploring how different societies embrace or resist digital currencies, mobile wallets, and traditional methods like cash, reflecting deeply ingrained cultural trust in institutions and technology.
- **Reading Habits of College Students**: Investigating the impact of digital versus physical reading on college students, this study highlighted cultural preferences for learning and the role of technology in education. It also raised questions around data privacy, particularly regarding how reading data might be used to predict behaviors and preferences.
- **Nutrition Cycles During Sporting Events**: Analyzing how athletes approach nutrition during competitions, this topic underscored regional differences in dietary preferences and health habits, with an emphasis on how cultural backgrounds influence food choices and performance.
- **Mental Health Among College Students**: Focusing on the mental health challenges faced

by college students, particularly during times of high stress, this research uncovered cultural stigma around mental health and varying levels of awareness and resources available to students in different regions.

- **Transparency of Online Interactions**: This topic examined how individuals perceive online interactions and privacy in digital spaces. It addressed issues like data tracking, consent, and the evolving expectations of transparency in online communication across different cultural contexts.
- **Biometric authentication**:. This topic explored how cultural differences affect the use of Biometric authentication and the ethics of using this data for identification and analysis. It concluded into study of how faces are represented in digital environments, particularly in the context of AI and facial recognition technology.

Each of these topics revealed distinct international differences in how data is interpreted and used, underscoring the influence of cultural context on the ethics of data practices. For instance, the approach to data privacy in the USA might prioritize individual rights and freedom, while in Europe, privacy laws like GDPR emphasize collective responsibility and stronger regulatory oversight. Similarly, while some cultures view digital payment methods as a natural extension of modern life, others may see them as a threat to personal autonomy and financial sovereignty.

Prototypes and Community Engagement

After conducting thorough research, students designed and presented prototypes aimed at raising awareness within their local communities about the data collected and its implications. These prototypes ranged from digital tools like mobile apps and websites to analogue designs such as posters, interactive installations, games, and workshops. Each prototype was carefully designed to cater to the cultural nuances of the respective community, ensuring that the messaging and presentation were both culturally relevant and sensitive.

Figure 1: Students and visitors at the presentation playing the Game *Crumbly Connection*

After researching internet cookies and their impact on digital transparency, KISD students created the game *Crumbly Connection* to enhance knowledge and control over cookies in a playful way (see Fig. 1). Their discussions with TXST students highlighted differences in cookie usage and data protection regulations between Europe and the USA, emphasizing privacy laws' influence on interface design and user experience.

Another KISD group looked at FOMO (Fear of Missing Out) in relation to social media and created an interactive analogue polling installation at KISD to visualize this phenomenon. The main aim was to raise awareness of FOMO itself and how social media can trigger this feeling. The exchange with the TXST students allowed them to consider different points of view, especially the connection between FOMO and the long distances in Texas. But the topic seemed to meet with interest on both sides. One quote on the shared Miro board was: "Both cultures have FOMO, digitally and in person".

Also using survey data, a team from the US wanted to study the reading habits of students in the state of Texas. Their question was how designers can use data to influence people's views

on a particular topic. They focused on a common activity in design practice: the visualization of data and its likely outcome in the user's perception. For primary research, they observed on campus and conducted a survey. For secondary research they looked at general statistics on reading habits in university communities.

They designed a series of posters with catchy phrases created from their research and collected data, aimed at engaging the audience and encouraging them to read more. In feedback sessions between the US and European teams, the students discussed about and reflected on the possible impact of such a campaign, but also the differences in reading habits at large, noting that students at universities also read together in book clubs, whereas in Germany reading is more of a private activity as university life is experienced very differently. It was these conversations that led to an overall understanding of the importance of international differences of cultures and their values.

Figure 2: Team “Mind Mosaic” developed an interactive sculpture shown above that uses data to create an awareness of the current mood of students on campus.

The topic of mental health was of importance to the students from Texas. Two project groups examined how to create more awareness and visibility for the sensitive topic through the

careful handling of data. Team “Mind Mosaic” developed an interactive sculpture shown above that uses data to create an awareness of the current mood of students on campus.

Another team visualizing post-pandemic mental health impacts through data on campus.

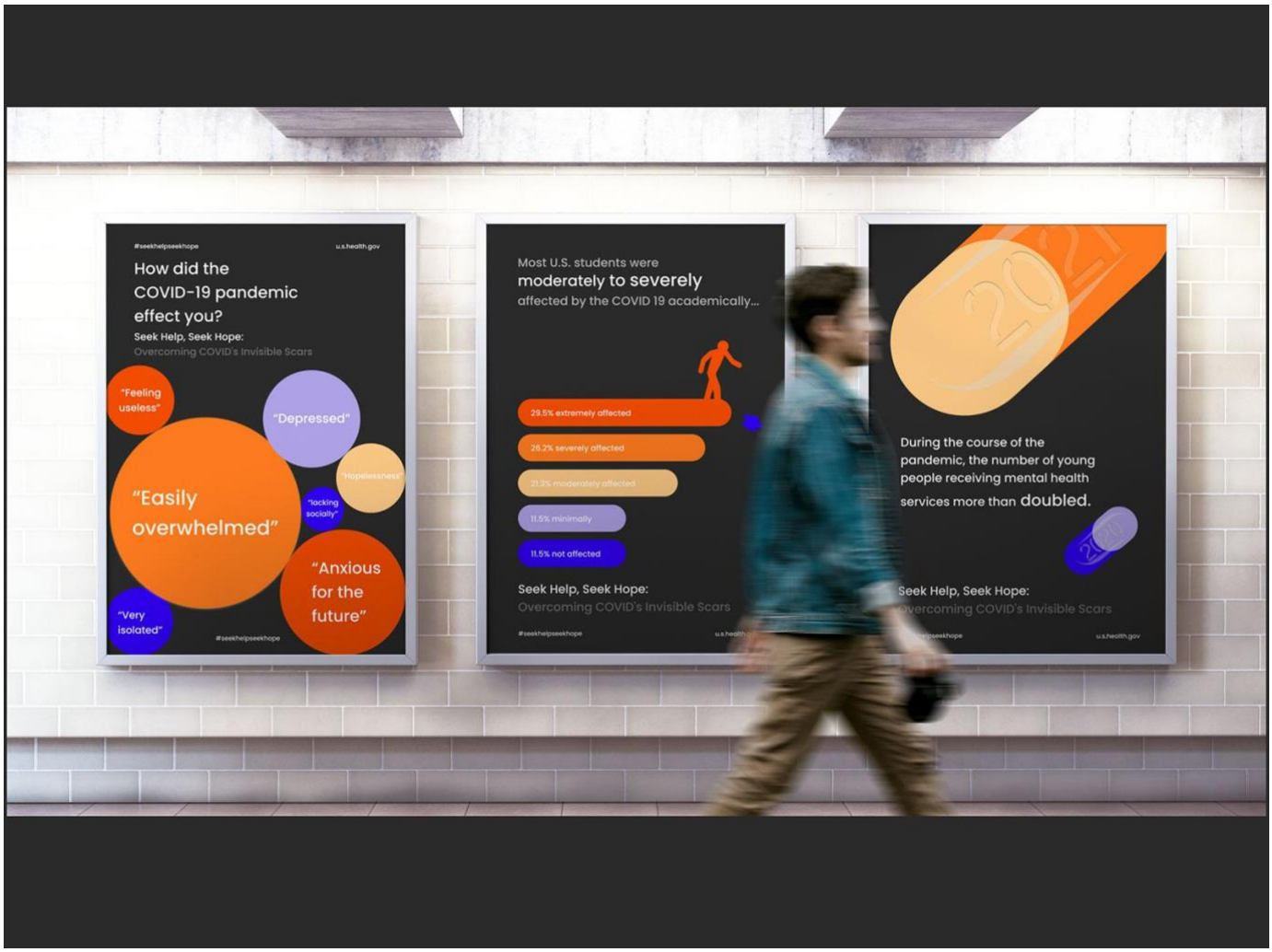

Figure 3: Another group from Texas worked on visualizing data on campus to raise awareness of the impact of COVID on students' mental health in the post-pandemic era.

Figure 3: Exhibition of the project *Payment Issues*. Display of a guide for creating a Badge for the own payment personality.

The interplay between payment methods and cultural attitudes toward privacy inspired KISD's *Payment Issues* team. They designed an analogue badge system to stimulate discussion, drawing on Germany's unique preference for cash, largely due to a lack of trust in digital payment systems and tracking issues with money transactions.

Figure 3: Visitors in the exhibition, trying to solve a puzzle of a face that an AI could build in seconds

With the increasing collection of biometric data and its processing by artificial intelligence in mind, a team from KISD developed a puzzle of a face to provide a haptic confrontation with the question of how algorithms process our data. Biometric data was also the subject of a group of students from Texas. They developed a concept to help runners with their nutrition and hydration during the Austin Marathon by using biometric data in a privacy-compliant way.

These prototypes were designed not only to inform but also to engage communities in meaningful dialogue about data privacy, transparency, and the ethical use of information. Through a design thinking approach, students iteratively refined their prototypes based on feedback from diverse cultural groups, ensuring that each design was both practical and ethically sound. The results were also presented at KISD's so-called Friday presentations. Visitors had the opportunity to try out the prototypes and discuss the topics presented.

4. Conclusion

By addressing these diverse issues through the lens of cultural awareness and ethical data practices, the project empowered students to recognize the importance of culturally sensitive design. The experience developed a deeper understanding of the complex intersection between design, data, and ethics.

The project was evaluated qualitatively using the 4L Method, where students reflected on what they *Liked*, *Learned*, *Lacked*, and *Longed for*. Students liked the cultural exchange to be one of the most enriching aspects of the project, particularly through deep, insightful discussions about the cultural differences and similarities they encountered during the design process. One student wrote "*The casual exchange of cultural differences and similarities was extremely insightful throughout our design process, It was exciting to learn more about Germany from a design perspective!*". The diversity in communication styles and collaborative approaches enhanced their learning experience, with participants feeling both understood and inspired by the feedback from their international peers. As Perttu Pölönen emphasizes in Future Skills, the ability to work across cultures is an increasingly critical skill in the modern workforce, fostering not only innovation but also personal growth through diverse perspectives (Pölönen, 2021). This sense of connection fostered a desire for more collaborative projects and additional interactive sessions that would further deepen engagement across cultural contexts.

From the students' perspective, the course provided invaluable lessons in data collection and usage, the role of cultural differences in design thinking, and the impact of cross-cultural perspectives on the design process. This exposure encouraged students to challenge their assumptions and broaden their thinking, ultimately shaping their views on the ethical dimensions of design and data. One student commented in the evaluation: "this course has made me think differently about design". As Erin Meyer argues in The Culture Map, understanding and navigating cultural differences in communication and decision-making is crucial for effective collaboration in today's globalized world (Meyer, 2014). Students experienced firsthand how cultural awareness could not only improve communication but also enhance the overall design process.

Design thinking played a central role in bridging these cultural differences. Tim Brown, in *Change by Design*, outlines how design thinking can serve as a tool for addressing complex global challenges by promoting empathy, collaboration, and iteration. Brown suggests that by focusing on human-centered design — understanding the needs, challenges, and perspectives of different stakeholders — design thinking allows for more inclusive and thoughtful solutions (Brown, 2009). This was particularly evident in the

project, as students used empathy-driven research to explore how cultural context influences the ethical use of data. By employing iterative problem-solving and collaborative design processes, students created prototypes that not only addressed local concerns but also reflected global considerations of data privacy, transparency, and inclusivity.

The evaluation also identified some constraints: students wanted more collaboration on joint projects with KISD students and more interaction through additional group meetings to deepen engagement. One student suggested: "I would have liked to do a project with the German students, and I HIGHLY HIGHLY want one class to have a studio side option like mixed media and we could showcase our art portfolio for an online show". The “Designing Data X Cultures” project will be offered in summer term 2025, where we will change the design by adding new opportunities for exchange between students in Germany and the US. It is also planned to exhibit the concepts and artefacts designed by the students at the University of the Future Festival in Berlin. The exhibition aims to stimulate dialogue about the sensitive use of data and the potential of intercultural projects at universities.

This project serves as an illustration of how design can facilitate transparent, inclusive dialogue around data practices. By understanding cultural nuances and the varying ethical frameworks that shape data interpretation, we can develop interventions that resonate with diverse communities. In doing so, we not only enhance collective data literacy but also foster a culture of trust and accountability in the use of data across borders. Pölönen’s call for an education system that equips future leaders with multidimensional thinking and cross-cultural adaptability is echoed here, as these skills are essential for navigating the complex ethical landscape of data use (Pölönen, 2021).

In conclusion, the findings from this project underscore the intersection of culture and data, highlighting the critical role design can play in addressing contemporary challenges related to data awareness. As Meyer points out, the ability to adapt one’s communication and decision-making style to fit cultural expectations is a key factor in successful international projects (Meyer, 2014). By integrating cultural sensitivity with ethical data practices, designers can lead the way toward more inclusive and innovative solutions in the digital age. This approach not only prepares designers for leadership roles but also sets the stage for fostering a broader cultural shift in how we understand and apply data. Design thinking, as Brown suggests, is a critical framework for shaping this shift, as it empowers individuals and organizations to approach problems with creativity, empathy, and a focus on human-centered solutions (Brown, 2009).

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Designing Ethical Leadership: Three Shifts For Design Leaders In Complex Times

ABSTRACT | Design leaders are uniquely equipped to drive ethical change in organizations and society, particularly in what Schön (1983) calls "uncertain, unstable, unique" situations. As their influence expands from design outputs to organizational systems and societal outcomes, their ethical development requires new frameworks and approaches.

This working paper, drawing from ethical design leadership workshops (2020-2023), examines design and innovation as an inherently emergent and pluralistic profession. Building on normative definitions of professions (Cooper, 2004), it proposes three pragmatic shifts to strengthen ethical design leadership:

First, expanding positionality discussions beyond personal identity to examine professional plurality, organizational context, and domains of influence, enabling leaders to better understand where and how they can effect and encode ethical change. Second, cultivating robust reflective practice through both individual and collective approaches, drawing on Schön's concepts of reflection-in-action and reflection-on-action to navigate the complexity of pluralistic practice. Third, developing 'ethical muscles'—eight proposed capabilities including perspective-taking, power-sharing, and caring stewardship—that support ethical navigation of everyday challenges.

These working frameworks offer practical tools for structuring cross-disciplinary conversations about ethical leadership in design and innovation, while providing a foundation for further development. Together, these shifts aim to cultivate muscular design leaders who can responsibly steward possibilities in organizations and systems alike.

KEYWORDS | Design Leaders, Ethics, Professional Education

1. Introduction

1.1. Developing the ethical design and innovation leader

> "You can make minor and inexpensive tweaks to the environment, which can produce big increases in ethical behavior....[the question is] how to design institutions in which real human beings, always concerned about their reputations, will behave more ethically." (Haidt, 2012)

Over the past two decades, designers have increasingly been called upon to address society's most pressing challenges, elevating both the stakes and ethical complexity of design practice. Their core capacities—people-centered orientation, interdisciplinary research, pattern synthesis, opportunity framing, and making concepts tangible—uniquely position them to address what Donald Schön (1983) calls "uncertain, unstable, unique" situations. This evolution demands integration across multiple innovation disciplines—design, strategy, product, service, and interaction—to create systemic solutions (Auernhammer, 2024). The field has further evolved through the adoption of co-design and participatory methods that directly engage multicultural communities and complex stakeholder contexts (Sanders, 2008; Cooper, 2004).

As design practice becomes more integrated and proximate to communities, designers face ethical questions that extend beyond their immediate design decisions to encompass processes, organizations, and broader systems. In service design, for example, designers shape the enabling environment around their interventions. As a designer rises in their practice and professional career— they also increasingly design aspects of the organizations in which they work. This evolution from designer to design leader requires a level of maturation and meta-reflection often overlooked in formal education and rarely addressed in day-to-day studio or corporate settings.

Ethical leadership represents a new 'frontier' for designers, as this conference suggests. This working paper, which emerged from a series of 'ethical design leadership' workshops conducted between 2020-2023, identifies key shifts and frameworks to support the development of ethical design leaders. It focuses specifically on leaders within interdisciplinary and strategic design practices, where professional complexity and plurality are inherent challenges. Section Three provides fuller context about these workshops, participants, and limitations. This paper includes excerpts of teaching slides, working frameworks, and interactive whiteboards from these workshops.

Design leaders merit particular attention as they shape not only design outputs but also teams, cultures, processes, and organizational systems. This rise in power has also come with its accompanying gaps in knowledge—about power (Aye, 2017). This expanding sphere of influence calls for a more comprehensive approach to developing well-rounded design leaders. An ethical design leader evolves from a sense of individual ethical responsibility towards collective responsibility; from modeling and navigating dilemmas to advocating and encoding ethical systems; from designing 'tweaks,' as Haidt implies (2012), to encoding more ethical approaches into the way we work.

Figure 1: A series of slides from the introduction of the design workshop to explain the rise from designer to design leader involves an evolution—**modeling** ethical behavior, **navigating** ethical questions and dilemmas, **advocating** for ethical practices, **encoding** and operationalizing ethical interventions and values. An accessible teaching metaphor invites participants to get off the "tweak treadmill"or StairMaster to elevate practice to a new level. (Kahl, 2020-2023)

While robust resources exist for ethics in research processes, emerging technologies, and personal ethical development, there are fewer pragmatic tools for structuring conversations and learning about ethical design leadership. This paper offers initial explorations of frameworks, in the context of a particular training, that support cross-disciplinary conversations about ethical and 'artful competence' that is often difficult to describe and teach (Schön, 1983).

This working paper propose three pragmatic shifts for developing ethical design leaders:

- Shift One: Expand discussions of positionality in professional contexts
- Shift Two: Cultivate robust reflective practitioners through creative, collective approaches
- Shift Three: Articulate & practice 'ethical muscles' everyday

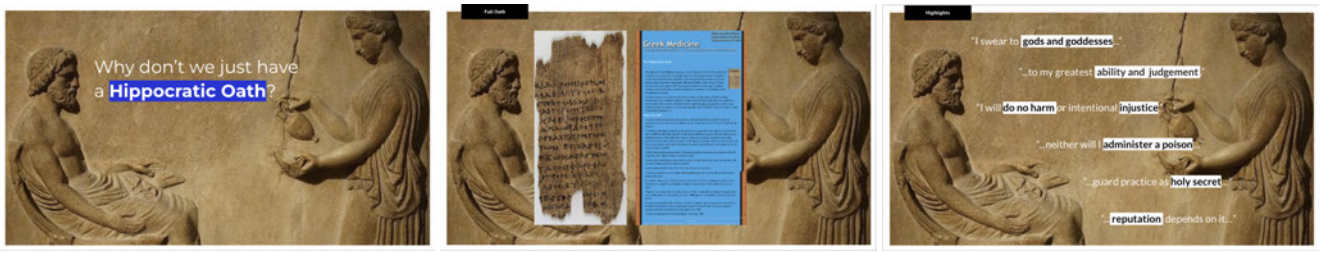
1.2. Recognizing our distinct professional ethics— plural & emergent

"We look to professionals for the definition and solution of our problems,
and it is through them that we strive for social progress.." (Schön, 1983)

"A normative definition [of professions] is useful, since it will make us more sensitive to the differences between moral and immoral professional practice and explicitly explain the vision that ought to inspire people to adopt a professional life" (Cooper, 2004)

What do we mean by "professional ethics"? What is the nature of the design and innovation profession today?

Both this paper and the workshop begin by establishing shared definitions of professions and professional ethics, which sets expectations for what moral professional entails. This framing also acknowledges the inherent challenges of working in emergent, interdisciplinary fields like design and innovation. As Schön notes, "the minor professions suffer from shifting, ambiguous ends and from unstable institutional contexts of practice, and are therefore unable to develop a base of systematic, scientific professional knowledge." This professional instability, when combined with the concept of 'professional pluralism' (explored further in Shift One) and rapid technological development, creates a particularly complex landscape for design leaders to navigate.



Figures 2a and 2b: A series of workshop slides .Top triptic: By reading and dissecting the Hippocratic Oath, participants develop a felt experience of a platonic professional ideal, its historical context, and its code. Bottom Pair: A shared definition of a profession and how design and innovation acts as an emerging and pluralistic form of professional. (Kahl, 2020-2023)

There are five primary components that establish a formal profession: i) esoteric knowledge or technical training, ii) national organization providing oversight and peer accountability, iii) provision of social value for a core human need, iv) strong moral commitment to shared professional values or code, and v) relative autonomy and discernment over decision-making (Cooper, 2004; Hoogland & Jochemsen, 2000). Traditional major professions—medicine, law, and divinity—are anchored by ethical codes that have endured for millennia, including the Hippocratic Oath (400-200 BC, Medicine) and Code of Ur-Nammu (2100-2050 BC, Law). The rapid technological advancement of the 18th-20th centuries sparked an 'explosion' of minor professions, each establishing their own codes—including engineering, architecture, psychology, education, and social work (Cooper, 2004).

Design and innovation fields have experienced their own micro-proliferation of professional and technical associations, each partially fulfilling aspects of formal professional definition (Acaroglu, 2016). While their moral commitments and privileged training varies, sub-disciplines like graphic design and interaction design have established clear professional bodies and codes. Strategic design and innovation practices— inherently interdisciplinary—lack a unified professional home. Contemporary design leaders, who increasingly cultivate multiple professional identities and areas of expertise, embody a 'professional pluralism' that is both sought after and fraught. Fraught, because we are increasingly invited into our era's biggest questions— yet our professional identity and ethical training remains inconsistent.

An ethical frontier, indeed.

2. The Three Shifts

2.1. Shift One: Expand positionality in professional contexts

The first shift is to expand positionality discussions to include a deeper investigation of one's professional pluralism, professional contexts, and domain of influence. This helps design leaders directly reckon with the emergent, pluralistic nature of the profession.

Understanding one's positionality—and regularly revisiting it throughout design research and practice—is a critical step in a designer's ethical development. Positionality involves systematic reflection on how one's social identities, values, and experiences shape both perspective and interpersonal dynamics (Rowe, 2014). These reflexive practices are increasingly integrated into design and engineering research, education, and practice (Noel, 2021; Hampton et al., 2021). While positionality tools are most commonly used by design researchers and social sector designers, they serve any practitioner seeking to understand their biases, critical frames, and relationship to power structures.

The positionality wheel is one such widely-used tool for structured reflection. While variations exist, Dr. Lesley-Ann Noel's framework provides a comprehensive foundation, examining dimensions such as race, ethnicity, class, family background, education level, ability, gender, and sexuality (Noel, 2021). This deeper understanding of identity—wrestling with the fundamental question "Who am I?"—enables designers to build critical foundations for conducting rigorous and responsible research, fostering inclusive teams, and developing equitable solutions. The growing adoption of these tools is particularly promising among design leaders, whose increasing professional authority makes ongoing reflexivity especially valuable to wield power responsibly.

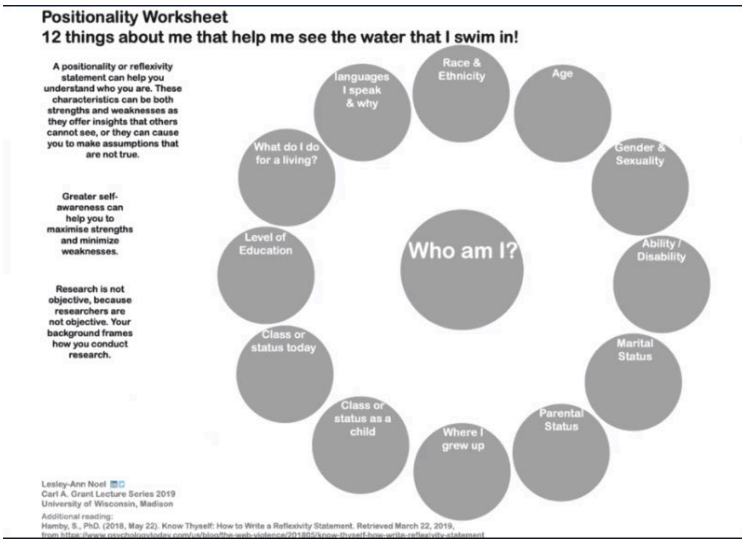


Figure 3: Dr. Lesley Anne Noel's Positionality Wheel Worksheet (2019)

While a design leader's personal positionality and values establish their ethical and moral foundation, an understanding of their professional positionality may help them navigate ethical complexity pragmatically. Increasingly, design leaders carry multiple professional identities, navigate nonlinear

professional pathways, and develop increasingly complex portfolios spanning diverse skills and sectors. This professional complexity mirrors what Donald Schön observed in the 1970s and 1980s as traditional professions faced a crisis in confidence in the face of accelerating technology, uncertainty, and emergent and overlapping professional practices. Schön suggested that the rise of "professional pluralism' called for professionals to develop an 'art of practice' or 'artful competence'— that involved reflecting and devising personal frameworks to synthesize one's multiple perspectives:

> *"In some professions, awareness of uncertainty, complexity, instability, uniqueness, and value conflict has led to the emergence of professional pluralism. Competing views of professional practice-competing images of the professional role, thè central values of the profession, the relevant knowledge and skills—have come into good currency. Leston Havens has written about the "babble of voices" which confuses practitioners in the field of psychotherapy. Social workers have produced multiple, shifting images of the nature of their practice, as have architects and town planners. Each view of professional practice represents a way of functioning in situations of indeterminacy and value conflict, but the multiplicity of conflicting views poses a predicament for the practitioner who must choose among multiple approaches to practice or devise his own way of combining them." (Schön, 1983)*

To grow one's ability to influence as a design leader, one must understand how their professional and organizational contexts shape their opportunities for 'encoding' ethics and what their responsibilities might be.

Shift in Action: Expanding Positionality

In the Ethical Design Leadership workshop, we explored and evolved exercises to navigate professional plurality. A preceding masterclass on positionality or power (given by Lesley-Ann Noel and George Aye respectively) set the foundation. This accompanying workshop dove more deeply into professional ethics. Participants were given a basic overview of ethics in the professions and called to deepen and activate their understanding of their professional positionality.

To activate this shift, we reflected on three professional perspectives:

Provocation	**Illustration**
First, **What is my unique professional plurality?** What are my professional identities? Do they have ethical or moral codes or perspectives? What distinct domain expertise and skills am I responsible for competence, knowledge, and quality? Do these intersect? Are they in tension? How?	***For example:*** *Consider a nurse who has pursued business education and transitions to an innovation role in a healthcare system. They blend multiple valuable perspectives. Their direct patient care experience and commitment to the 'Code of Ethics for Nurses' (ANA, 2025) combines with their managerial training and administrative responsibilities to create a unique professional lens. What tensions are they in? What values do they share?*

Figure 4: Professional Pluralities / The workshop incorporated synthesized case studies of professionals with diverse career paths, using their positionality narratives to deepen participants' reflections.

Second,

What is my professional context and pathway? What type of organization or institution am I operating within currently? What has been my professional context over time? Am I an insider or outsider to the situation? How do these practice contexts shift my perception, offer perspective, expand my stakeholders, or blind me?

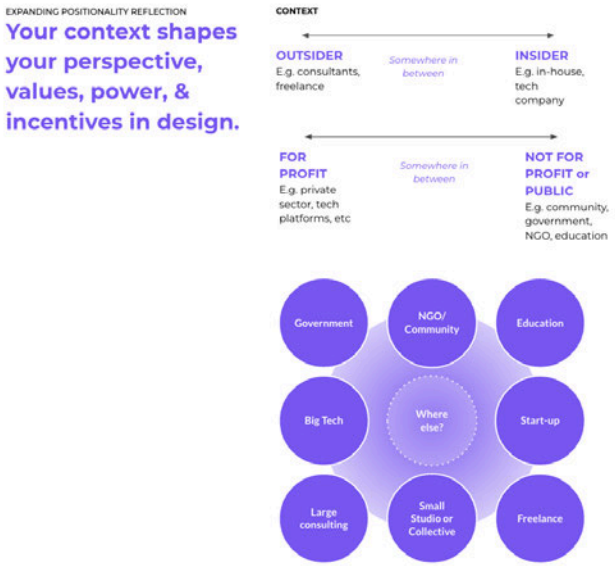


Figure 5: Institutional Context Analysis / The workshop prompted participants to list and reflect on how their professional design settings shaped their positionality.

For example:

One practitioner went from a customer-facing role to a training consultancy to experience and service design role at headquarters. Each afforded a different piece of the knowledge puzzle for designing powerful service and employee experiences. This multifaceted set of perspectives made them extra sensitive to power dynamics and ensuring research was responsible and relational. By owning their own narrative, they could better switch hats to advocate internally and build in protocols to protect and uplift retail-facing teammates.

How does prior experience in one sector influence decision-making in another? What practices or methodologies might successfully transfer between sectors? These considerations ultimately shape how practitioners understand and fulfill their professional obligations within their current role.

Third, **What is my dimension of ethical influence in my organization, institution, or work setting?** **Do I have outsized influence on products, process, studio, and/or business?** Are there common challenges or situations we encounter? Do I have power to shape the underlying processes, culture, or assumptions of that domain? Can we devise a way to encode a more caring, less harmful practice in this organizational system?	***For example:*** *We gave examples of how a range of design professionals can influence practice. For example, a leader or business development associate may have influence over the* ***design business dimension****. In the workshop, we gave the example of Greater Good Studio's "Gut Check" for new business, which acted as an 'ethical intervention' that encoded values into their business pipeline.* *For the* ***design studio dimension****, we looked at people structures. The co-founder of WeUnlockNYC, a company designing fair housing products, shifted their hiring and governance model to create a Leadership Collective of those with lived experience that reviews research, product roadmaps, and internal policies (Figure 8). This is an example of encoding an ethical approach into their studio management.*

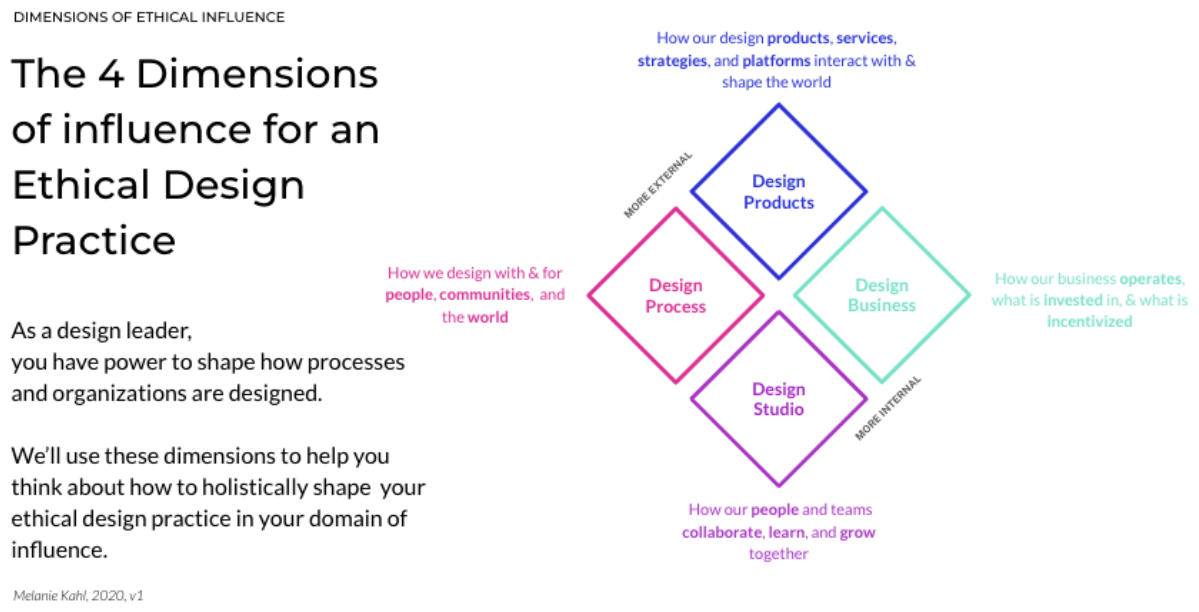


Figure 6: Dimensions of ethical influence— Design Process, Design Products, Design Business, Design Studio
See below for example of a workshop exercise. (Kahl, 2020-2023)

In the workshop setting, we reflected on the positionality prompts through guided individual reflection and paired and group discussion. This built on their foundational positionality identity work, but with new professional practice dimensions. The last positionality prompt, about each design leader's dimensions of influence, was an opportunity to surface common questions and challenges, case studies, inspiration, and concrete situations to workshop with colleagues. The ultimate goal? Defining a domain of power and influence to encode ethics into their design organization. In a diverse group of design and innovation leaders, this common framework facilitated a richer, pragmatic discussion.

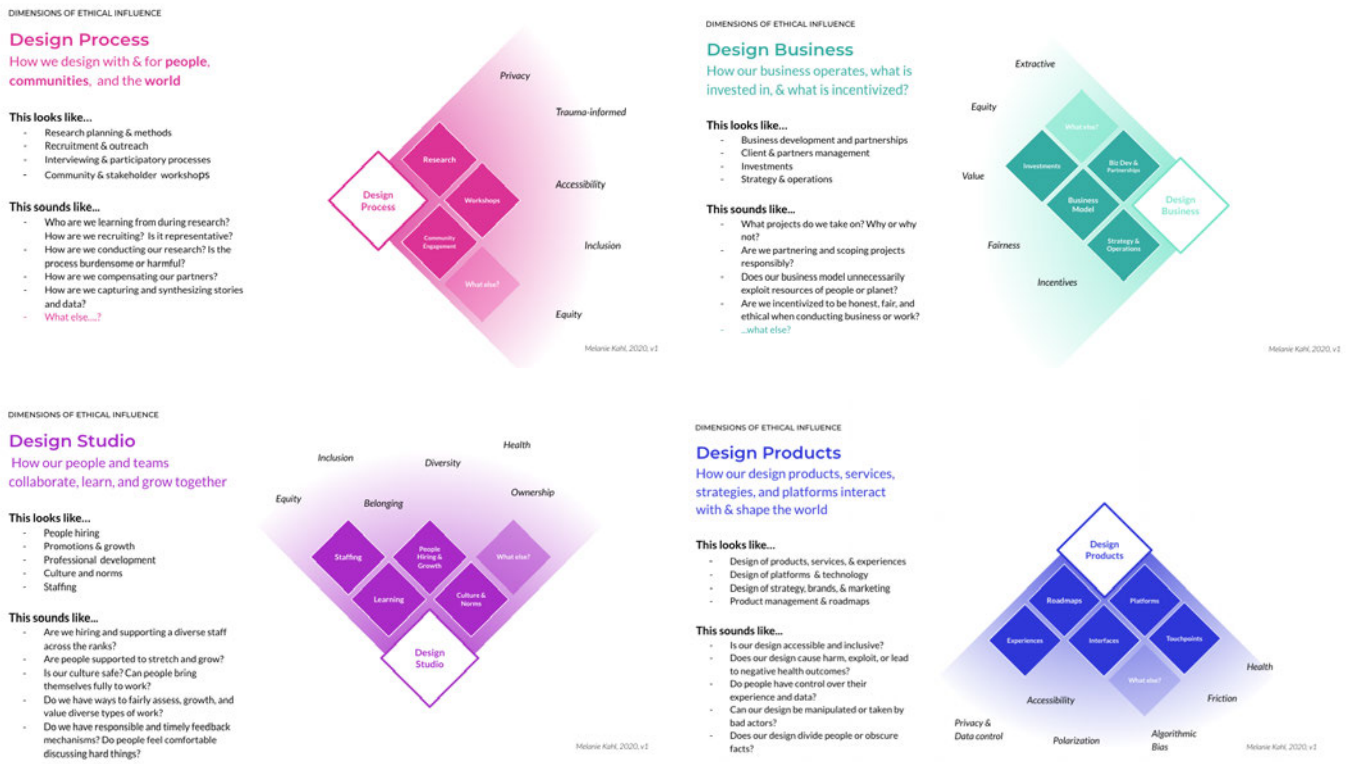


Figure 7: Detailed picture of each dimension of ethical influence— Design Process, Products, Business, Studio. By unpacking what they look and sound like, participants could identify areas where they most felt ethical friction and opportunities for encoding ethics. (Kahl, 2020-2023)

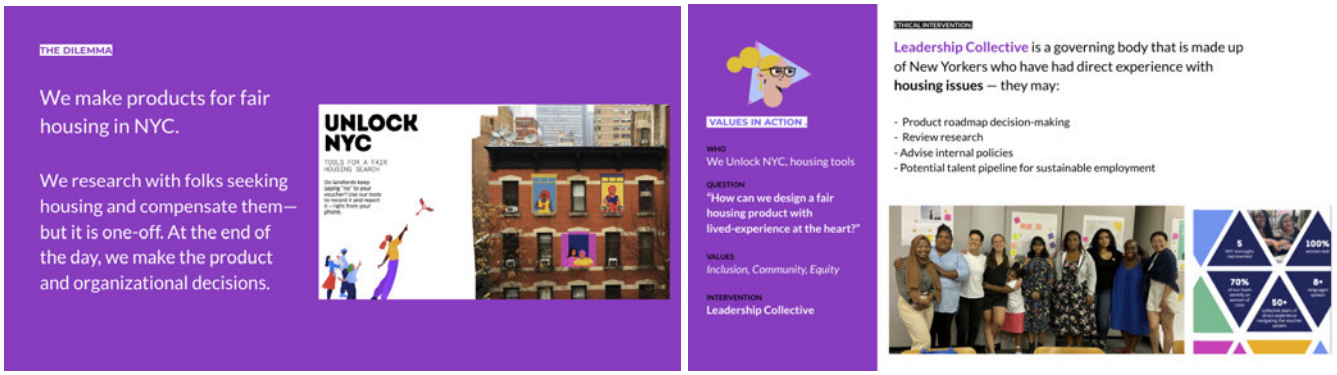


Figure 8: A case study of "We Unlock NYC"— the team 'encoded ethical practice' into their design studio by introducing a leadership collective governance structure. Content shared by Ashley Eberhart.

When design leaders deeply examine their position within their professional discipline, context, and domain, they can better focus their ethical influence. This expanded understanding of positionality enables designers to more effectively engage in practical ethical discussions that arise in daily practice. Strategic design and innovation professionals relatively emergent societally speaking and one are asked to wrestle with increasingly complex social challenges. Schön calls us to more artful navigation of our plurality— these three prompts and frameworks presented here offer innovation professionals across disciplines a shared language for discussing their scope and potential for impact. Moreover, they allow design leaders to assess and shape their design practices for opportunities to encode ethics.

These prompts can be paired with other powerful ethical perspective-building exercises, such as:

- positionality wheels and lens building (Noel, 2019) (Noel, 2024)
- clarifying and articulating values (Klau, 2010) (Barendregt et al., 2021)
- defining a scope of practice (McKercher, 2024)
- ethical stance-crafting (Dietkus, LCSW, 2025)
- power mapping (Aye, 2017)

2.2. Shift Two: Cultivate robust reflective practitioners & approaches

The second shift focuses on diversifying reflective practices—both individual and collective—to help practitioners navigate increasingly complex, ethically nuanced situations.

Both individual and collective reflective practices are central to the development of the ethical design leader—especially in the face of professional and societal pluralism and complexity. Why? It is essential to developing self awareness, negotiating professional plurality and interdisciplinary, and navigating nuanced dilemmas of practice. Schön's studies of various professionals (e.g. architects, urban planners, psychologists) revealed that the most effective and thoughtful professionals demonstrate dual awareness: they think about what they are doing as they are doing it. This ability allows them to problem solve effectively in ambiguous situations. Whether or not they can articulate this tacit knowledge immediately, it is important raw material for reflection that needs special scaffolding to draw out:

> "In real-world practice, problems do not present themselves to practitioners as givens. They must be constructed from the materials of problematic situations that are puzzling, troubling, and uncertain. In order to convert a problematic situation to a problem, a practitioner must do a certain kind of work. He must make sense of an uncertain situation that initially makes no sense." (Schön, 1983)

While it is usually applied to technical problem solving, Schön's frame has been used by other practitioners— like social workers— in an ethical context (Reamer, 2013). Reamer describes social workers heightened 'ethics radar' as they navigate the various situations of their daily practice and cases. Design leaders too can develop heightened 'ethics radar.' Schön offers practitioners multiple ways to think about reflection. First, 'reflection-on-action'— a retrospective look or reconsideration of a situation with an eye towards what could be changed or evolved. This might be a debrief or guided journaling exercises. Second, 'reflection-in-action'— the act of reflecting on something as it is happening, considering the

situation, 'thinking on your feet,' and even experimenting with the situation itself (Schön, 1983).

Both of these types of reflection are critical to the ethical development of individual design leaders. To deepen a leader's skills as well as grow the capacity of a studio— collective reflective practices are critical. And seemingly less written about beyond debriefing tools. Sharing stories in the workshop was a fertile start, but designers need more modes of collective reflective practice.

The case study method is hallmark to almost every professional's responsibility and ethics education—from business to bioethics. In engineering education, cases that reflect on the micro, macro, and extreme situations stretch the ethical dialogue and allow for developing professionals to discern and wrestle with the complexity of a situation (Harris, 2004). However, in pluralistic professions—there is a gap in these cases. Outside of graduate education or bespoke skill development, these critical tools for collective ethical development are hard to come by. What might that look like?

Shift in Action: Reflecting through roleplay and bespoke case development

One example of cultivating robust reflective practitioners comes from personal experience as a leader within Dalberg Design, a design strategy and service design studio working in the global development sector. In 2017, we engaged Consensus Building Institute to craft a bespoke workshop on designing and facilitating with diverse stakeholders. The process began with a mediator (David Fairman) who conducted in-depth interviews of 6-8 team members, from which he created tailored case studies and role-play scenarios. By abstracting real experiences into teaching tools, the workshop enabled a global design team to collectively explore and reflect on their practice in a neutral setting, free from client pressures and with reduced organizational power dynamics. This creative and collective reflection approach created a safe space for discussing ethically complex scenarios and developing shared understanding. It also simulated both reflection-on-action and in-action by crafting a live scenario.

Teams strengthen their ethical practice when they combine ongoing project-based reflection—both individual and collective—with creative experiences that promote deeper processing. To grow the next generation of ethical design leaders, we will need more such creative reflective tools and experiences.

Figure 9: A design team puzzles through a bespoke ethical dilemma case study derived from real stakeholders and diverse contexts. (Picture from Dalberg Design—Senegal, 2017)

2.3. Shift 3: Articulate & practice 'ethical muscles' everyday

> "Nobody is ever going to invent an ethics class that makes people behave ethically after they step out of the classroom [using their rational mind]." (Haidt, 2012)

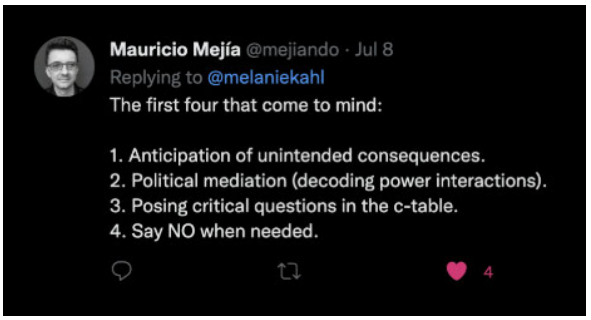
> "In fact, many of the other design industry associations (IDSA, AGDA, IGDA, IDIBC) have ethical codes of conduct that members must abide by; they entail doing no harm, being good to your client, protecting rights such as privacy, etc. These are cornerstones of most industry ethical frameworks…However, they are not good enough. *Cognitively, agreeing to something you didn't decide upon has very little weight in broader decision making contexts….. But no number of ethical guidelines can make the decision for you in the moment.*" (Acaroglu, 2016, author's emphasis)

The third shift is about bringing ethics to life by articulating and practicing 'ethical muscles' to better navigate complexity.

Developing into an ethical professional takes practice. Ethical codes, moral frameworks, nor classroom teaching can completely prepare one to navigate the range of complex dilemmas that arise in the course of design practice. Moreover, identifying and thinking about an ethical dilemma is one piece of the puzzle of navigating it. A design leader may not know what type of situations may arise, so how do they prepare in advance?

Using the language of the body, this paper and workshop series proposes the development of 'ethical muscles'. These are the component skills that are a part of navigating everyday ethical situations, larger dilemmas, and the work of encoding ethics into an institution. This shift to embodied language complements the trend of bringing the whole person into ethical and moral formation—from the importance of emotions in moral cognition (Davis, 2016) to 'felt ethics' as a way to develop ethical sensibilities (Garrett et al., 2023). It also allows for design leaders to intentionally identify areas of strength and growth in their own development.

Through a series of practitioner interviews, queries on social platforms, and three courses of workshops to test and evolve, we developed a provisional set of eight 'ethical muscles' for creative leaders. Each has an active orientation, an accompanying description, and component skills to hone through training or practice. For example, 'Shift & Share Power," aggregates a range of relational and political skills relating to power— from thinking in systems to techniques to shift, share, and cede power. One might pursue meditation training or employ power mapping tools to flex this muscle. All in the service of being able to navigate the everyday ethics of being a design leader in an increasingly complex world.



The eight provisional muscles include:

1. Awareness and discernment
2. Deep listening and perspective taking
3. Creating space and crafting questions
4. Shifting and sharing power
5. Caring and stewarding people
6. Sparking change through stories
7. Prototyping towards progress
8. Envisioning pragmatic possibilities.

Figure 10: Eight ethical muscles for design leaders to develop and hone. (Kahl, 2020-2023)

Shift in Action: Articulating Muscles

Over the course of the workshop, design leaders gathered components of their ethical leadership plan. The last step? Identifying which muscle(s) leaders wanted to practice, how they wanted to grow them, and from whom they wanted to seek support. Leaders were paired to share their plans and exchange ideas for continued development.

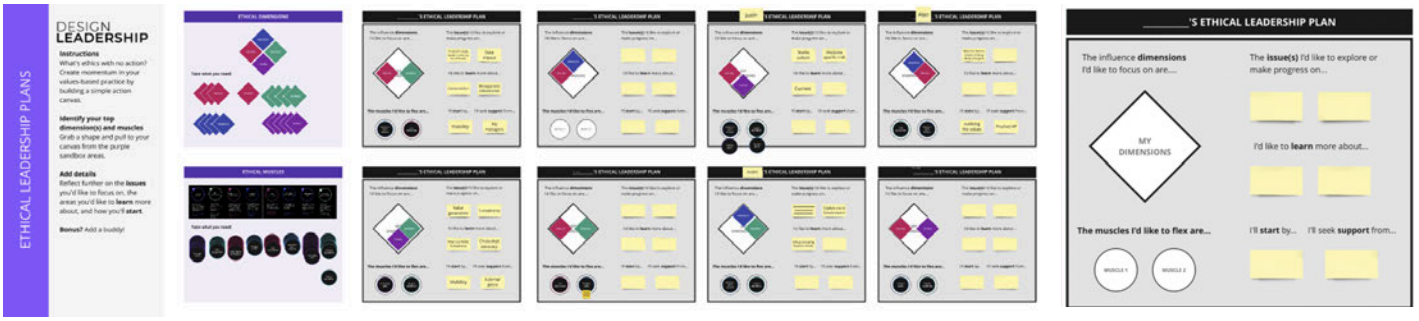


Figure 11: An interactive whiteboard showing the creation of ethical design leadership plans—with extra emphasis on the dimensions of influence and muscles to grow.

3. Looking forward

3.1. Limitations and explorations

This working paper explores pragmatic approaches to expanding ethical practice among design strategy and innovation leaders, complementing existing discourse on ethical design practice across disciplines. The author acknowledges several key limitations and assumptions:

- **Workshop context**: The paper draws from three iterations of a virtual ethics workshop within a 10-week "Design Leadership" course between 2020-2023. Each cohort included 12-16 practitioners, primarily from North American organizations with some participation from Latin America and Europe, spanning technology, consulting, and civic sectors. While this diversity contributed to broader applicability, future iterations would benefit from:
    - More focused participant selection by experience level and geography (to refine and test)
    - Extended duration beyond the half-day format
    - Direct input into participant recruitment
    - Pre and post work to define case studies and activate leadership plans
- **Evidence Base:** Case studies and examples were sourced by the author through:
    - Desk research
    - Personal professional experience
    - Interviews with professional collaborators
    - Participant reflections
    - Crowdsourcing from extended professional networks (LinkedIn, Slack communities)

  Future development requires more systematic data collection methods, including structured surveys and collaborative workshops, to strengthen the frameworks' empirical foundation.
- **Provisional frameworks:** This is a working paper—the proposed frameworks remain provisional, having been tested only in professional development settings. Specific limitations include:

    - The "ethical muscles" framework (Shift Three) could be deepened through a literature review on ethical sensibilities and skills and a broad survey
    - The reflective practitioner section (Shift Two) requires further development. This section was shortened significantly during the workshop setting and originally intended to be an add on session or coaching.
    - All frameworks would benefit from additional testing with collaborators in a range of settings
- **Future exploration:**
    - A survey or workshop to explore and refine “ethical muscles”— to build out examples and refine ways to ‘practice’ and develop muscles
    - An ethical design workshop for studios to redesign different ethical dimensions of their studio practice
    - An organizational audit tool developed out of the “ethical dimensions” or broader curriculum development rooted in “ethical muscles” and "ethical dimensions”

- **Author Expertise & Positionality:** This paper is necessarily informed (and limited) by this author’s expertise, experience, network, teaching, and self and formal study of professional ethics. I am a US-based, design strategy leader and adjunct professor with global professional experience in 17 countries and teaching in the US, Europe, and Central America. A majority of my experience is in the social, education, or civic sectors— with some significant projects with purpose driven brands and social media platforms. The seeds of this professional ethics exploration were planted at Northwestern University in 2008, under the study of the late feminist, care ethicist, Martha Holstein.

3.2. An Invitation

Professional development experiences are a fertile laboratory for blending theory, practice, and hatching new pragmatic frameworks. This working paper, while exploring the 'ethical frontiers' of design leadership, offers both a foundation and an invitation: to develop and test practical approaches for cultivating the next generation of ethical design leaders. These increasingly pluralistic practitioners deserve deep philosophical rooting, reflective scaffolding, and practice to grow their muscles. These containers— to explore, develop, and sensemake— are crucial to developing the skillfulness and discernment to effectively navigate increasingly complex challenges and opportunities for society.

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Designing for a post-growth society: Towards a framework for ethical and social impact assessment

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ABSTRACT | This paper examines the role of design in navigating the social and environmental challenges of the climate crisis, exploring how design practice might align with post-growth principles. Based on the premise that perpetual economic growth is incompatible with ecological limits, post-growth thinking calls for a fundamental reorientation of design: one that prioritizes well-being, equity, and sustainability over market-driven expansion. While design has long been entangled with capitalist modes of production and consumption, it also possesses the potential to reimagine infrastructures, narratives, and material conditions in ways that support a transition beyond growth. The paper focuses on how designers might critically reassess their professional purpose to foster an ethical, socially responsible practice. Conventional design models often reinforce unsustainable consumption patterns, yet design also carries an inherent normative force, as it does not merely reflect reality but actively shapes it. The need for a more intentional and reflective design practice is thus imperative. We propose a framework for assessing design's ethical and social impact, structured around five key programmatic actions: alignment, revision, awareness, mitigation, and expansion. These categories articulate distinct but interconnected strategies that enable designers to engage with complexity, reconfigure professional priorities, and cultivate a practice attuned to the demands of a post-growth transition. Despite the growing discourse around responsible design, methods for assessing long-term ethical and ecological contributions remain limited. We therefore also tackle the challenge of measuring the impact of design. Drawing on impact assessment methodologies, we explore ways to integrate rigorous, multidimensional evaluation practices into design processes. We conclude by arguing for and supporting calls to a shift in how design is conceived, not as

a neutral, market-serving tool, but as an agent of systemic transformation. The transition toward a post-growth paradigm requires designers to not only rethink their role but to actively construct pathways toward more just and sustainable futures.

KEYWORDS | Post-Growth, Sustainability, Ethics, Design for Systemic Transformation, Impact Assessment in Design

1. Introduction: Ethical Leadership in Design: Towards a Post-Growth Era

This article focuses on the climate crisis from the perspective of design and on how to navigate its social and environmental effects. Drawing from post-growth theories, which propose an alternative socio-economic model, we ask how we might define a new paradigm in the field of design and what indicators we should use to assess whether we are contributing to a transition towards this new model.

In recent years, the concepts of post-growth and degrowth have gathered interest in public debates. We understand degrowth "the planned reduction of energy and resource use designed to bring the economy back into balance with the living world in ways that reduce inequality and improve human well-being" (Hickel, 2020: 25). The notion deals with the tension between economic growth and its limits, based on the premise that on a planet with finite material resources, extractive economies and populations cannot grow indefinitely (Sabini, 2021). Meanwhile, post-growth strategies integrate degrowth goals with those of social justice. We follow Paulson and Büchs (2022) in that a viable transition requires public support to validate political actions; this condition is already met in 34 European countries, where 60.5% of the population supports post-growth (Paulson and Büchs, 2022: p. 6).

Design plays an important role in modern capitalism, influencing the creation, commercialization, and consumption of products, services, and systems. According to various authors (e.g., Monteiro, 2019;, Bohnert, 2018), design is inextricably linked to the climate crisis and social injustice for this reason. Post-growth models reveal the myths we tell ourselves and warn that there is no possible future if economic growth remains tied to resource consumption. We must dismantle the belief that growth is always a sign of progress. Given the expected readership of this article it might not be necessary to argue that design. Besides encompassing notions of form, aesthetics, and functionality, it is strategically connected to the conception and planning of the human-made world. We take, moreover, understand design broadly and primarily as an activity and a discipline concerned with the prefiguration and reconfiguration of the material and immaterial infrastructures that mediate our beings and doings (Author2, 2021: 4–8). Design profoundly affects our everyday lives by transforming our individual and collective cosmovisions (see e.g., Nelson and Stolterman, 2014; Author2, 2021). What's more designers are thus involved from the outset in matters of genuine ethical concern, if only because "designing is 'materializing morality'" (Verbeek, 2011: 90).

With these premises, we ask, How can we rethink the design profession to direct our capabilities towards contributing to a transition towards degrowth while fostering positive environmental and social impacts? What would an alternative design model focus on? How can we redirect our capabilities to generate needs, social dynamics, raise awareness on various issues, and build narratives that are more hospitable to more livable futures? What indicators could we use to analyze the impact of our interventions to assess whether we are contributing to a degrowth transition?

2. Defining Purpose in Design

We understand professions as occupations that aim to promote, ensure, or safeguard some aspects of others' well-being (Bayles 1981; Whitbeck 2011). Merely serving others' wishes is insufficient to count as a profession because a profession must help people "attain certain goods that play a crucial strategic role in living a flourishing life as a human being" (Oakley and Cocking 2001: 79). In this manner, professions can be rightly

considered “moral projects” in themselves (Carr 2000: 28–31). Our understanding of design, which revolves around the conception and planning of the human-made world, plausibly supports considering it a profession, as the discipline can play a pivotal role in people’s lives and flourishing (for a comprehensive discussion, see Author2, 2021: 19–119). However, because it is a new profession and while it already exhibits a strong critical tradition, its ethical foundations *qua* professional practice are still far from being as robust as those of the nursing or teaching professions (Author 2, 2021: 101–103, 123–125).

Design also has a normative and ethical dimension as it proposes, voluntarily or involuntarily, ways of living. This is a central issue in the profession; design is normative as its use or application prescribes norms or standards, explicitly or implicitly. Therefore, design is necessarily concerned with what constitutes "good living" and what is good (more than what is right).In design practice, there is thus a paradox: it is a profession with significant impact and yet it retains great ambiguity about its ultimate purpose. Other professions have a clearer ultimate purpose (medicine and nursing, for instance, are clearly connected to promoting and preserving health and well-being). This indeterminacy has traditionally led us to serve market interests, being either unaware or indulgent of the consequences of our decisions. Indeed, Viktor Papanek famously noted in 1971:

There are professions more harmful than industrial design, but only a very few of them. And possibly only one profession is phonier. Advertising design, in persuading people to buy things they don’t need, with money they don’t have, in order to impress people who don’t care, is probably the phoniest field in existence today (Papanek, 2000, p. ix).

Thus, if we understand, as Herbert Simon said, that "design is concerned with how things ought to be" (Simon, 1996, p. 67), we should be committed as design professionals to the identification and integration of desirable scenarios for the futures we generate. If we understand the ethics and responsibility of the designer as going beyond obligation and duty, as proposed by Author 2 & Ventura, 2024, we can envision a much more viable and rich ethics in our practice. Practicing design more responsibly would be a way to become who we seek to be.

A number of narratives have emerged in recent years that reimagine the role of design in ways particularly relevant to this research, as they more directly acknowledge the social and environmental responsibilities of design practices and propose more conscious and respectful approaches to eco-social systems. Arturo Escobar (2018) is one such figure, contributing to the analysis of the logics that have led the profession to diverge from sustainable orders and equilibriums and proposing new forms of creation connected to the philosophies of "good living." Donna Haraway (2016) also encourages us, with her tentacular thinking, to continue confronting the problem, moving away from perfect, final solutions and understanding that we must collectively and interdependently face the emergencies in which we find ourselves. Haraway highlights the crucial role of communication and storytelling as tools for forging new ways of understanding the world, which can serve as acts of revolt and resistance. Joanna Boehnert (2018) also recognizes the most damaging areas of professional impact when the profession is subordinated to industry, and proposes a theory of change based on counter-power.

We join these calls and believe the design profession must transcend being a tool in service of accelerating the unsustainable consumption system that produces and reproduces global inequalities. Instead, we must center our practice on defining a clear and independent purpose, focusing on positive environmental and social impact anchored in the ambition of professional virtue and the rigor of measurement as an ethical commitment to our purpose. It is necessary to clarify our broader purpose as professionals and accompany it not only with good intentions but also with evidence of our contribution to a greater purpose than serving clients’ wishes in the form of a design brief.

We assume that design can have a significant influence in facilitating the eco-social transition towards post-growth, given its capacity to generate high degrees of social and environmental impact through its interventions. We won't argue in more detail that the purpose of design needs to revolve around conceiving and shaping livable, more just futures and referring the reader to the aforementioned sources. Rather, assuming design can have this significant influence, we want to ask, How can we measure the impact design can have in the transition towards a post-growth context?

3. Designing with Intent: Beyond Mechanicism

To explore ways to expand design capacities to address complex challenges and global urgencies, we sketch five major categories of programmatic actions that design professionals could introduce to transform the sector, contributing to reducing the material demand linked to the growth model.

These actions are:

1. Alignment
2. Revision
3. Awareness
4. Mitigation
5. Expansion

Figure 1 shows the proposed categorization of these actions for a post-growth transition. They are divided into internal activities, referring to the profession's working methods, and external activities, referring to the type of services that can be offered. In the next subsections, we briefly describe these actions and include examples coming from design practice.

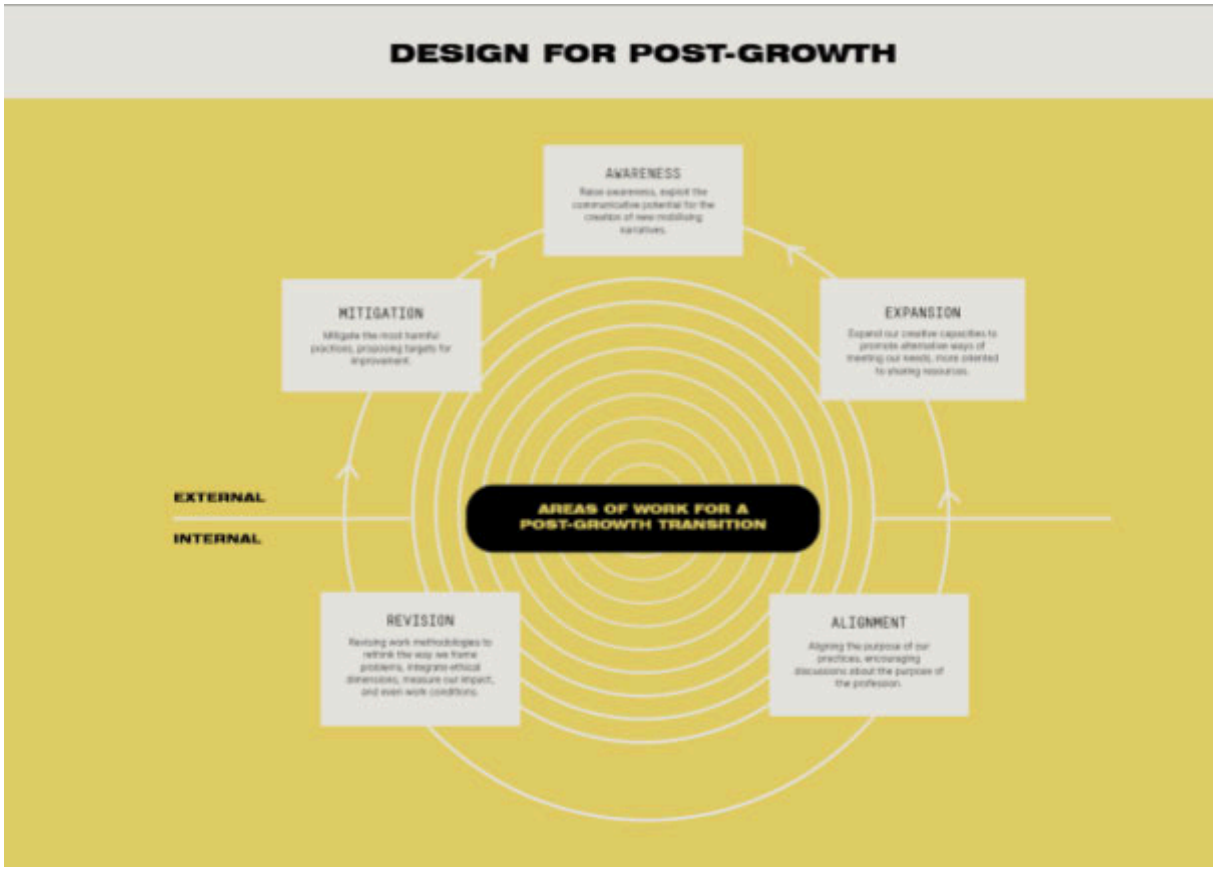

Figure 1: Diagram of internal and external areas of design input to transition (Source: author1, 2024).

3.1. Alignment

Reflecting on the social and environmental implications of professional practice at different levels: individual work, design studios, and the profession as a whole. Prioritise debates on the *what for* of design. What can be the common purpose as a new profession and historically closely linked to a system centred on consumption and growth that is currently in crisis? Aligning then, decisions on the type of employment we generate taking into account the quality and fairness of it, with the ultimate purpose of the sector in a measurable way.

The project *Postgrowth.design* serves to illustrate alignment. Postgrowth.design is an initiative that explores speculative scenarios and concrete practices in order to address the fears, expectations, aesthetic, ethical, political and emotional implications linked to the challenges of degrowth. They argue that design, as a discipline entangled in systems, is also a tool capable of enriching imaginaries, forms of organisation and production, ways of life, and subjectivities that tend towards a society detached from the myths of capitalist growth.

3.2. Revision

It is key to revisit habitual methodologies to incorporate approaches to more complex problems and integrate the dimension of ethics and labor values into work processes. Professional designers ought to initiate and sustain a deeper reflection on the ethical side of their professional practice. This fits what Schön (1983) calls *reflection-on-action*, which is performed outside a design situation. It consists in the ability to scrutinise one's own design processes and one's actions and thoughts. This activity enables the designer to explore the reasons why they acted as they did, in order to evaluate and improve their own process and increase their levels of skill and expertise. The goal of the revisión activity is to internalize guidelines for ethical action *during* design practice (see Author2 and XXX, forthcoming).

The Design Justice Network (DJN) has a mission to harness the collective power and experiences of its members to create safer, fairer, more accessible and sustainable worlds. This exemplifies the revision activity. In their methodological and theoretical work, they champion the idea of design for care, healing, liberation, happiness and deep sustainability. More concrete examples of how design can be led by marginalised communities, dismantle structural inequality and advance collective liberation and ecological survival can be found in *Design Justice. Community Practices for Building the Worlds We Need* (Costanza-Chock, 2000).

3.3. Awareness

Directing design and communication capabilities toward creating and mobilizing new narratives. Generating desirability and credibility for alternative futures that break with the current paradigm. Making current challenges visible and understandable to the general public to facilitate a mindset of transformation in a more conscious way with the global crises. Often information is available, but understanding it in an era of *infoxication* is a challenge for most of us. The role of designers as translators of complex realities could become an unlocker of more coherent decisions between the information we have about the actions that need to be prioritized in order to mitigate some of the most pressing issues in the world.

An example of awareness is *Referente Disnovation.org,* a collective between contemporary art, research and hacking. They develop artistic interventions that seek to empower imaginaries and practices related to post-growth, while challenging dominant "technosolutionary" ideologies. They promote the idea of reconnecting human survival with the living and material qualities of the biosphere, drawing on ecofeminism,

indigenous knowledge, environmental accounting and historical materialism.

3.4. Mitigation

Identifying the practices and decisions made in design exercises that have the most harmful impacts on the environment and people. Learning to measure these, setting goals, and strategies for improvement. Upskilling the professionals to better understand the impact of their choices they make whenever choosing a material, a software, a production method, a colour or a specific user experience technique among individuals and environments to mitigate the most harmful effects that create harmful behaviours in individuals and worsen our environmental conditions.

An interesting example of mitigation activities can be found in the book *Flourish: Design Paradigms for Our Planetary Emergency (Ichioka & Pawlyn, 2021)* . The book proposes an approach to address today's challenges related to climate change and sustainability. In a post-pandemic context, it highlights the need to rethink traditional paradigms in organisations around the world and invites business leaders to adopt regenerative approaches, abandoning unsustainable production and consumption practices. He argues that the current concept of sustainability has fallen short, proposing new ways of thinking and acting to address the planetary emergency by presenting regenerative, reconciliatory, restorative, sustainable, green and conventional systems, from more to less, aligned with a regenerative impact and in relation to the need for energy consumption.

3.5. Expansion

Redirecting creative capacities to design solutions fostering new ways of meeting needs and relating socially that rely less on consumption and more on resource sharing, avoiding material waste, and requiring less energy to live better. This activity presupposes a model to guide a transitioning towards degrowth. One such model could be the so-called *Doughnut Model*, developed by Kate Raworth (2017). This model balances human needs with planetary boundaries and consists of two concentric rings representing the *social foundation* (ensuring basic human needs such as food security, health and education, and an outer ring representing the *ecological ceiling* (preventing environmental degradation such as chemical pollution and biodiversity loss). For Rawort, the space between these rings is the “safe and just space for humanity” to thrive sustainably.

The Post Growth Guide (Feldthus & Haumann, 2025) is an educational platform aimed at professionals who want to learn how to align business with planetary boundaries. It is committed to redesigning businesses to prioritise resilience and sustainability over financial extraction and endless growth.

4. Measuring Ethical Impact & Ethical Practices in Design Processes

Often, impact is argued with weak and unsound assumptions under rigorous investigations (Clift, Phillips & Pritchard, 2021). This section aims to address this deficit by providing practical tools that help us objectively and rigorously understand the impact of our actions. To know how we are contributing to this transition, we must measure our contributions and determine whether our actions produce the desired changes or improvements.

In other words, if our design interventions are intended to raise awareness of an issue, change the behaviour of a citizen, user or consumer, break a taboo on an issue or

reduce the impact of CO2, we must equip ourselves with the necessary tools to be able to understand how, with our design decisions, we impact on these eco-social contexts. Before continuing, we want to point out some substantial limitations in the field of design and the measurement of its impact:

1. *Short-term measurement*: On the one hand, the fact that the design sector works mostly on the basis of specific, time-limited projects, and rarely on a long-term basis, means that the time frame available for measurement is generally too narrow. For example, on their website, the IAB (Interactive Advertising Bureau UK [IAB UK], n.d.), the UK's digital advertising industry body, gives a lot of indicators on how to measure the impact of campaigns digitally, but leaves behind long-term effects.
2. *Measurement of economic bias*: On the other hand, most design impact measurements that are developed over the longer term are biased by the fact that companies collect only or mainly economic impact data. The research team assumes that this bias is justified by the interest in getting more investment in design. Hence the importance of demonstrating its maximum benefit. For example, Sheppard et al. (2018) develop the Design Index Indicator, which looks at the correlation between economic growth of a business and degree of design integration within their business model.
3. *More measurement than evaluation*: Often, the metrics that are collected consist of quantitative data and are not always contrasted with previously established results, nor are learning processes carried out that allow the results to be extrapolated and the knowledge generated to be built upon. For example, In a shallow approach to web advertising and communications, metrics such as page views, click-through rates, and cost per click are heavily relied upon, often without deeper analysis or connection to business goals or communication strategy.

Considering these shortcomings , we want to explore other impact measurement methodologies that might be able to inspire the design sector to broaden its perspectives in this regard. As a case in point, the field of development (development cooperation) is selected. Development is a professional field where designers often intervene whose main purpose is to to improve social and environmental conditions. Therefore, more advanced methodologies for the measurement of long-term socio-environmental changes are desirable.

In related research by one of us, (Author1, 2024), a website (XXXXX) was created with the aim of becoming a dissemination tool for the sector providing a narrative on the importance of impact measurement in the sector and brings together a set of practical resources to guide impact measurement in an accessible and simplified way (Figure 02).

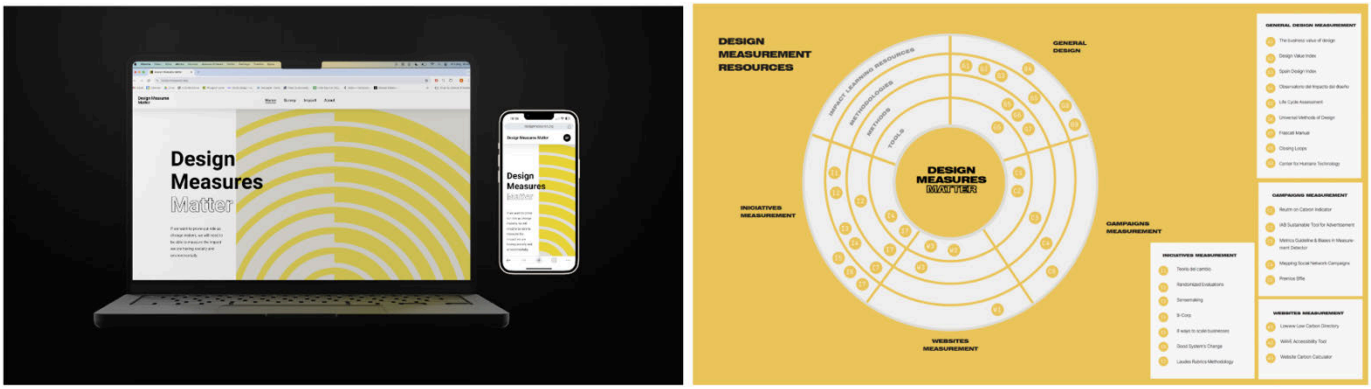

Figure 2: Accompanying website.

Below we offer a selection of examples of initiatives, measurement methodologies and resources for different types of initiatives. Taken together, these tools provide a practical starting point for addressing the challenges of measuring ethical impact in design and promoting more responsible practices in the industry.

B-Corporate
Measurement focus: Environmental and social impacts of business.
Description: The B Impact Assessment is a 360° impact measurement and management tool used by more than 200,000 companies worldwide to improve their social and environmental performance. To embark on the path of impact management, it is necessary for companies to measure their environmental and social impacts with the same rigour with which they manage their financial indicators, from a holistic perspective and considering the impact on all stakeholders. Since 2007, B-Corp has been developing free and open access tools to support companies in this first step.

Laudes Rubrics Methodology
Measurement focus: Systemic change, measurement and learning approach.
Description: A rubric-based methodology created by the Laudes Foundation to support the philanthropy sector to understand its contribution to change, while learning and adapting to new and unforeseen circumstances. They argue that change cannot be captured by numbers alone, because metrics focus on what can be counted, and not always on what matters most. Rubrics are a framework that sets a standard for what is "good" and creates a shared language for describing and assessing it using quantitative and qualitative evidence.

Life Cycle Assessment
Measurement focus: Environmental impact of a product's life-cycle
Description: LCA is a methodology used to assess the environmental impacts of a product, process or service throughout its entire life cycle (ISO 14040:2006). ISO 14040 defines LCA as the collection and evaluation of the inputs, outputs and potential environmental impacts of a product system throughout its life cycle. Along the lines of this standard and with the main objective of helping LCA practitioners to put it into practice, other codes of practice have been developed. In the EU context, the European Commission's Joint Research Centre has published the international reference manual for the life cycle data system. Since 2013, to improve the comparability of LCA applied to products and organisations, the European Commission has launched the Environmental Footprint methods, which calculate the total carbon impact of a product "from cradle to grave", taking into account the collection and processing of raw materials, the manufacture of the product, its distribution, its use by the consumer and its eventual disposal.

Lowww
Measurement focus: CO2 consumption of websites
Description: Lowww is a directory of lightweight websites that has been created to inspire digital industry players to design and build lighter and greener products, using the median web page weight of the HTTP file as the main reference to calculate the impact. They calculate the difference between the weight of a web page and the average weight of a web page and convert it into a percentage. The CO2 calculations use the Sustainable Web Design methodology.

Website Accessibility Evaluation Tool

Measurement focus: Web Accesibility
Description: WAVE is a website that presents a set of evaluation tools that help create more accessible web content for people with disabilities. WAVE can identify many accessibility and Web Content Accessibility Guidelines (WCAG) errors, but also facilitates human evaluation of web content. They focus on issues that affect end users, facilitate human evaluation and educate about web accessibility.

ROCO2
Measurement focus: Climate impact of campaigns.
Description: Purpose Disruptors is a collective of professionals working in the advertising industry. They propose a simple calculation to measure the climate impact of advertising campaigns: "the increase in sales driven by advertising" multiplied by "the carbon footprint per item sold". They also propose to replace or complement the standard business measure of "return on investment" with a "return on carbon" (ROCO²) to maximise profitability while minimising carbon emissions. Ecoeffectiveness is the new metric they propose, "Return on Carbon" (ROCO²), to measure the climate impact of advertising campaigns by multiplying the advertising-driven increase in sales, per carbon footprint, per item sold. The new metric measures "return on CO2e": the additional revenue generated per tonne of CO2 equivalent emitted. If return on investment is about giving a figure for "profitability", ROC can be seen as a measure of "return on burn". The methodology uses Life Cycle Assessments (LCA). Where no LCA exists for a specific product, it is possible to use category level data, which will give a less accurate result. This data is combined with effectiveness data - which shows the increase in sales generated by advertising - to provide a measure of the commercial impact of a campaign in relation to its environmental impact.

IAB Clickhead Booklet
Measurement focus: Advertising
Description: The IAB, uniting the digital advertising sector to promote innovation, set common standards and simplify the complex. The IAB also advocates for the harmonisation and standardisation of digital advertising broadcast measurement, which can help streamline the process and enable comparable analysis. Within their resources they also offer a Measurement Toolkit in which they present six signs that professionals should watch out for to avoid bad habits when it comes to measuring digital advertising, and what you can do to avoid being a #Clickhead (a term they use to name marketers who love click-through rates and reject more sophisticated and nuanced techniques to measure their campaigns). Some of these bad habits and biases are *default bias* and *confirmation bias*, which are cognitive biases that negatively influence decision-making by favoring familiar choices and seeking information that confirms an individual's existing beliefs.

Diverse approaches and tools for measuring ethical impact and design practices have been explored, highlighting both their limitations and opportunities for improvement. From extensive and rigorous methodologies such as B-Corporate's B-Impact Assessment, which covers social and environmental aspects, to the Laudes Foundation's rubrics, which integrate quantitative and qualitative data to assess systemic change, the need for broader perspectives on measurement is evident. Specific tools such as Life Cycle Analysis (LCA) for products and services, or Lowww and WAVE, which address the impact of web design in terms of CO2 and accessibility, respectively, highlight the importance of measuring impacts in specific sectors. Finally, initiatives such as ROCO², focusing on the climate footprint of advertising campaigns, and the IAB's guide to improve measurement in digital advertising, underline the relevance of adopting innovative and more meaningful metrics.

5. Conclusion: Towards a New Design Paradigm

This paper has aimed to contribute elements of reflection on how we can accompany, from the practice of design, the socio-economic transition towards a post-growth model. We explore the narratives and the state of degrowth and post-growth, identifying a necessary paradigm shift. We analyse institutions and scholarly references, mapping their theoretical and practical contributions. We found that post-growth design practices lack robust systems to measure their social and environmental impact, which limits their capacity to evaluate results. We extended the research to impact measurement methodologies, focusing on communication campaigns and proposals such as ROCO2, an environmental impact indicator. However, we found an insufficient scenario, dominated by economic metrics and with few tools to assess long-term impacts. To address these shortcomings, we explored sectors such as cooperation and social innovation, looking for good practices transferable to design, including dynamic and alternative measurement strategies to better parameterise contributions towards eco-social transitions.

We want to offer some considerations to be taken into account when facing the challenges of impact measurement:

- *It is one thing to measure and another to evaluate*: In the first case, data can be collected without further ado; in the second case, it is a matter of comparing it with a target or benchmark, which need to be part of a larger model such as the Doughnut model. Sensemaking and learning processes come later, as the learning phase is not always part of the process, which would lead to measuring without learning. Qualitative KPIs can give very vague or shallow information.
- *Static models for dynamic challenges*: Logic frames and theories of change seem to have limited flexibility in the face of the changing scenarios presented by the wicked problems of our time as defined by the new design approach to transitions defined by Terry Irwin.
- *Short-term measurements for structural challenges*: Often, design projects end up measuring one-off interventions that are confined exclusively to the limits of their time frame, with little or no recourse to broader or more general measurements. Such measurements are often ineffective in capturing longer-term social and environmental effects.
- *Measurements at the design level are often biased by neo-classical economics.* They focus primarily on the bottom line (i.e.., revenue). In the framework of this research we have not found *designerly* longer-term impact measurements to guide an organisation's actions.
- *We measure reach rather than influence*: In campaign design, the use of engagement KPIs and the level of media impact are widespread practices. However, it is less common to find the integration of more qualitative measurements of how campaigns have impacted behaviours and mindsets.

With this work we want to offer a contribution to what is proving to be a growth opportunity for design as a profession. A new space where the knowledge and experiences of this discipline can be agents of change towards more sustainable societies. A reality to which we can contribute, with care and awareness, with all that we know and all that we can learn. With creativity and rigour. If we understand our profession as a dance, we know that there are moments to train and moments to dance. To thrive as a profession we need to be able to shape a new paradigm for ourselves, to glimpse the necessary paths to do so and to provide us with the tools to measure and understand what we do.

Measuring and understanding the impact of our work as designers has often been far from our usual procedures. Perhaps because of this, we are sometimes unaware of some of the most harmful consequences of our practice and, loaded with good intentions, we generate collateral damage and externalities of which we are unaware. "Measure", "count", "understand", "improve" are often verbs that sound to us like examinations, control and lack of freedom, so necessary for creativity. For this reason, they seem like foreign bodies in our field. However, we count the days left to see our loved ones. We remember the birth dates of those we care about. We blow the years we have achieved. Our relationship with metrics is clear, we measure what we value. Measuring can therefore be a way of caring. Caring for what matters to us and, above all, what matters most.

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DESIGNING FOR CIRCULARITY: A GRADUATE FRAMEWORK FOR ENTREPRENEURIAL AND INTRAPRENEURIAL LEADERSHIP IN SUSTAINABLE ECONOMIES.

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ABSTRACT | This working paper will present our research on developing a graduate program that enables designers to evolve into entrepreneurs and intrapreneurs equipped to lead and manage the transition to circular economies worldwide. As circularity gains traction among nation-states, standards for circular practice are expected to influence regulatory frameworks. Circular economy frameworks offer a measurable approach to defining "sustainability" and emphasize the role of design leaders in identifying opportunities that support enterprises, biosystems, and societies. While circularity concepts are emerging in design curricula, the focus remains primarily on materials, methods, and waste management. Although essential, these areas alone do not provide designers with the strategic frameworks needed to lead and manage transitions within economic and enterprise systems. Driving circularity through design will require new mindsets, toolsets, and skillsets, along with a mission to create systems of exchange that not only engage but enrich and enliven. Our research seeks to support this mission by identifying necessary skillsets and toolsets and developing curricula that support design-driven strategies for circularity. This working paper will present our progress, offering a framework for consideration and potential partnership opportunities.

KEYWORDS | ETHICS, LEADERSHIP, DESIGN, ENTREPRENEURSHIP, CIRCULARITY, EDUCATION

1. Introduction

This working paper highlights the importance of educating leaders to design triple-bottom-line strategies that benefit enterprises, communities, and ecosystems (Elkington, 1999). This approach contrasts with both traditional business education and traditional design education. Business education prioritizes profit generation over sustaining living systems. Design education prioritizes the creative and efficient use of materials. Neither business leaders nor design leaders have been well educated to design systems that align human enterprise with the imperatives of ecological and societal well-being.

This paper outlines the research and process of inquiry that informs the design and delivery of a proposed 18-credit "Fellowship," structured as a graduate offering that meets the specifications for an Advanced Graduate Certificate and EU Postgraduate Diploma to be:

- Delivered online in real-time over one year with an optional hybrid residency/practicum
- Inquiry-guided experiential learning in study groups of 8-16 current and emerging leaders
- Team-taught by multidisciplinary faculty
- Designed to be offered through a network of educational partners

The intent of the Fellowship is to provide participants with an understanding of the power and consequences of design leadership at a critical turning point in the Anthropocene. Our goal is to enable entrepreneurs and intrapreneurs to use the strategic power of design to shape circular exchanges based on ethics grounded in:

- The realities of systems dynamics and interdependence
- The material and non-material needs of humankind
- The survival imperative of our genes

2. Context and Contribution

This paper presents our initial findings on the current context of leadership education. Its contribution to that context is its emphasis on examining the ethical responsibility of the leader to design strategies that enable a transition to systems of circularity.

Our methodology includes an extensive literature review on leadership, design, design leadership, sustainability studies, circularity, ethics and economics. Our ethnographic research includes informal and ongoing conversations with industry partners, designers, leaders, professional associations, program participants and alumni.

We have focused our research on circularity as an emerging discipline of study, not yet fully woven into the curriculum of leadership, design, or sustainability studies. We can see potential for educational offerings that can leverage the focus on circularity in national initiatives. It is our research intention to explore how best to educate leaders able to discover, define, design, and deliver (4D) systems of exchange focused on circular flows.

3. The Ethical Challenge in Leadership Education

Traditional business schools and MBA curriculum often fail to elevate ethical considerations (Bennis & O'Toole, 2005), which are integral to the value of life or living systems. Instead, they prioritize providing leadership mindsets, toolsets, and skillsets that enable leaders to efficiently produce profit within economies of exchange organized around consumption. Design leaders trained in traditional business schools are taught to focus on quantitative measures of success, sidelining creativity, ethics, and sustainability.

Leaders are trained in the "ethics" of free enterprise systems, which prioritize efficient production and optimal return on investment. The core mission is to create and grow economic value. As a result, leaders focus less on moral values or principles that guide ethical behavior, and more on compliance with legal norms and mitigating reputational risks. Resource utility replaces reverence as the dominant view of the natural world. The future is measured in quarters. What cannot be measured matters little; what cannot be monetized matters even less (Rushkoff, 2011).

According to Sumner (1907), “The word ‘moral’ means what belongs to or appertains to the mores... The morality of a group at a time is the sum of the taboos and prescriptions in the folkways by which right conduct is defined. Therefore, morals can never be intuitive. They are historical, institutional, and empirical” (pp. 29, 37). Sedlacek (2013) argues that economics and ethics are intertwined and the moral dimensions of economic decisions must be actively considered.

Building on this, we believe that ethics, when detached from the ethos of people, risks becoming an abstract system that seeks to impose universal doctrines of right and wrong, weakening its practical application in leadership. Leadership education must integrate ethical thinking that is deeply rooted in social and cultural contexts. But to some degree, business has become its own social and cultural context (Coolidge, 1925; Susskind, 2024). A transition to circularity will require an examination of the overreach of business as a social and cultural framework. It will also require the emergence of other frameworks that orient leaders to design for a wider wellbeing.

Emerging frameworks like Australian Government (2023)’s first National Wellbeing Framework demonstrate how nations can redefine leadership priorities. By centering equity, sustainability, and resilience, these frameworks provide a roadmap for future leaders to balance economic and ecological goals effectively.

4. From Sustainability to Viability

Leadership behaviors that set human enterprise against the collective wellbeing and the aims of life are not just unethical but also unsustainable. Yet they are common, supported by social norms and educational practices that encourage leaders to adopt an amoral approach to decision-making. Sustaining life is a genetic imperative. Every species must secure its niche and safeguard the affordances offered by its environment. All species must organize social relations and economies of exchange toward this shared aim. When aims of material well-being and economic development jeopardize society or the environment, we undermine our own survival (Wright, 1994).

Sustainability is not optional. It is a prerequisite for survival and viability.

> "The decision-maker's attention should be focused on the context in which the organization operates, in which it dynamically becomes a component of a variety of viable systems in which it realizes its own role. In other words, the survival of the organization depends on the survival of the context in which it operates" (Formisano et al., 2018, p. 10)

Author (2011)'s "Triple Bottom Line by Design" emphasizes that sustainability is an ethical mandate grounded in principles of stewardship and reciprocity. According to the author, "Sustainability is not about eco-efficiency or even eco-effectiveness, it is about an eco-ethic—a value that speaks to the character of the organization and its compact with its community of customers and with life".

We believe that the emerging discipline of circularity can deepen our understanding of systems thinking and the ethical responsibilities of stewardship. By designing systems that minimize waste and pollution, circulate products, services, and materials, and maximize resource regeneration, leaders can ensure economic viability and ecological health (Ellen MacArthur Foundation, n.d.).

5. The Business Case for Circularity

Traditional business education often views the world as a resource to exploit rather than a system to sustain. Leaders are trained to maximize productivity and profits, often ignoring the interconnectedness of human and ecological systems. This reductionist approach fails to prepare leaders for the complexities of real-world challenges, where adaptability and systems thinking are crucial (Rutherford, 2021; Winston, 2014).

The concept of homo economicus (Papadogiannis, 2014), a rational and self-interested economic agent, has dominated leadership education. However, this model is disconnected from the realities of human interdependence and ecological limits. Markets must be redesigned to serve societies, not the other way around. This mindset shift requires entrepreneurial and intrapreneurial leaders to recognize the interdependence of human and ecological systems, fostering long-term viability while focusing on economic goals.

Circularity offers a measurable approach to defining "sustainability" and a new model for entrepreneurial and intrapreneurial leaders (Pilipenets et al., 2024). Geissdoerfe et al. (2016) argue while "sustainability" aims at benefiting the environment, the economy, and society at large, the main beneficiaries of the Circular Economy appear to be the economic actors that implement the system. Positioning economic actors as beneficiaries rather than antagonists can help move change.

Business that promotes "robust circulatory flow" (Fullerton, 2015) aims to utilize "waste" from one process as "resources" for another. By adopting this approach, businesses reduce waste disposal costs and raw material expenses, and create more competitive advantage and economic value through circular innovation. Intrapreneurs and innovation are critical to this internal process.

Entrepreneurial leadership in the circular economy means to "create value for the broader system an organization is part of. Rashid et al. (2013) describe circularity in business models and supply chains as a precondition for sustainable manufacturing and that closed-loop manufacturing systems as economically and ecologically viable.

(Suchek et al., 2022) observed that circular entrepreneurship, conceptualized as the processes of exploration and exploitation of opportunities in the circular economy domain (Zucchella & Urban, 2019), contributes to sustainable development through value proposition, value creation and delivery and value capture (Cullen & De Angelis, 2021; Ünal et al., 2019). Designing value capture based on the values that support and sustain life is the work of the 21st century leader.

We propose that this work will require a reexamination of consumption-driven, debt-fueled economic growth that cannot be supported. The design and leadership of circular exchanges can enable the growth of resilient communities and biosystems, and create and grow economic value (Hart, 2024).

6. The Moral Case for Circularity

What is a circular flow? And why do they morally matter? In sum, "what goes around comes around." "The unequal distribution of wealth and materials greatly destabilizes society and strains Earth's life support systems" (Circle Economy Foundation, 2024). Circular flows represent systems where materials, financial resources, and investments return to their origins to nourish and sustain life. Investments that sustain firms must also sustain the communities they rely on—not only during prosperity but also during crises. Abandoning communities in times of need is a common business practice, but it contradicts moral principles such as "love-thy-neighbor". It is more like "beggar-thy neighbor".

Unguided by moral precepts, leaders often prioritize shareholder interests and the enterprise's immediate financial well-being. In practice, this has led to captains of industry exiting markets, abandoning communities whose value they've consumed, and steering resources toward safer investments. Such behavior aligns with traditional "good" business practice but is grounded, in part, in 19th-century utilitarian ethics that view economic development as a universal moral good (Bentham, 1789; Mill, 1879).

However, the ethical appeal of this utilitarian perspective is diminishing, particularly for customers and communities who fund enterprise resilience only to be left without support when they need to rebuild. Circular flows matter because they ensure that resources—financial or otherwise—flow within ecosystems. When funds move from local communities to global markets controlled by shareholders, those shareholders can easily divest. In contrast, communities, businesses, and individuals tied to a specific place cannot simply abandon their homes, jobs, or networks. Regenerative economies sustain long-term vitality by continuously reinvesting money, information, energy, and resources back into developing internal capacities, particularly human kind. The rate at which money circulates at local and regional levels may be the most crucial metrics of economic health replacing GDP growth (Georner, 2015; Fullerton, 2015).

A moral business case can be made for aligning strategies with the emerging conditions of an earthbound world. Our ability to adapt—not merely to compete—will ultimately determine our viability. Leaders need to value life rather than attempt to put a value on every living thing (Rushkoff, 2011; Martin, 2000). Enterprise leaders need values in practice that design and deliver on viability. Values that help define the problems we tackle.

> "Almost all real problems are incompletely and imperfectly specified, and to tackle them, we have to close them in some way. Closure means deciding what to bring in and what to leave out. Even when faced with what appear to be

> simple choices, we have to create our own description of the problems we try to solve." (Kay, 2012)

Ethical leadership is indeed a new frontier for design. Design is at its best when challenges are imperfectly specified, requiring intentional ethical choices about how to "close" the problem. Unfortunately, design leaders are often educated to adapt themselves to pre-determined strategic intentions, with little input into specifying or framing those strategies. They are trained to view societies as nested within markets rather than acknowledging that markets are nested within societies and living systems.

7. The Need for Strategic Design of Circularity

Exceptional design educators—like William McDonough (2002), Allan Chochinov (2007), and Emily Pilloton (2009)—have advanced the power of design to change mindsets, innovate toolsets, and apply skillsets to create life-serving solutions. However, the standard design curriculum remains just that: standard. Leaders and designers are insufficiently educated to analyze systems dynamics or account for the full consequences of their decisions on social and natural ecologies. The focus on a user is useful, even necessary, but not sufficient.

If leadership and design continue to prioritize those who can pay, the collective cost will be staggering. Societies will be reduced to transactional markets, and living systems will be further degraded into mere resources. Consider the coffee shops that have replaced public spaces: they offer no access to non-paying individuals, no facilities, and no opportunity for broader social engagement.

7.1. The Consequences of Linear Flows: A Case Study in California's Wildfires

As we write, wildfires are ravaging Los Angeles, presenting significant challenges to the insurance and financial industries but even more so to those who rely on these services. Home insurers such as State Farm, are rapidly withdrawing from California and Florida at alarming rates (Botros, 2023).

Figure 1. An estimated 7,000 structures have been damaged or destroyed by the Eaton Fire in Altadena, California. Justin Sullivan—Getty Images

JPMorgan Chase projects economic damages from the fires to reach $50 billion, and costs continue to rise (Lee, 2025). Insurance companies are pricing risk, exiting volatile markets, and leaving states to absorb financial burdens. Without insurance, the housing market itself becomes unsustainable. Mortgages require insurance, and homes cannot be rebuilt, purchased, or sold without it.

The impact of climate chaos threatens corporate viability, destabilizes markets, burdens governments, and exacerbates inequality between those who can pay for private safety measures and those who cannot. For example: Private firefighting services cost between $3,000 and $10,000 a day. And despite the high cost, these private groups are often seen as a liability rather than an asset due to different training backgrounds (Arango & Kamin, 2025).

Putting a price on human life and essential life-saving services can erode trust and social cohesion. Wealthy individuals can pay for protection, but communities at large are left vulnerable. Sandel (2013) raised questions about the moral limits of markets, we can see this in the privatization of public services.

7.2. Strategic Context-Sensitive Learning

Circular Economy curricula often adopt a one-size-fits-all approach, neglecting the unique cultural, social, and economic contexts in which circular strategies are implemented (Murray et al., 2015). For example, the challenges and opportunities for

circularity in resource-scarce regions differ markedly from those in affluent economies. In resource-scarce regions, limited access to advanced recycling technologies and infrastructure often necessitates reliance on informal systems of material recovery. Community-led waste management programs in Sub-Saharan Africa have demonstrated how localized, low-tech solutions can address resource constraints effectively while fostering community engagement (Murray et al., 2017). However, these solutions often lack the scalability and regulatory support seen in more affluent economies.

Conversely, in affluent economies, the focus tends to be on high-tech innovations such as automated recycling plants or sophisticated lifecycle tracking systems. While these technologies drive efficiency, they can also exacerbate inequalities by marginalizing small-scale recyclers and ignoring the social dimensions of sustainability. For example, in Europe, the implementation of extended producer responsibility (EPR) schemes has improved recycling rates but has also led to complex regulatory environments that exclude informal or community-based actors (Kirchherr et al., 2018). These disparities highlight the importance of designing circular economy strategies to the unique socio-economic and cultural contexts of each region to ensure both environmental and social equity. By failing to address these nuances, current programs risk promoting strategies that are ineffective or culturally insensitive.

We propose a strategic context-sensitive approach to enhance the relevance and applicability of Circular Economy education. This includes designing curricula to address the unique challenges of specific industries, regions, and cultures. Collaborative partnerships with local stakeholders can provide students with experiential learning opportunities, fostering a deeper understanding of place-based circular strategies. For example, Circular Economy Portugal (2022) engages in several place-based innovations that address local environmental and social challenges through circular economy principles.

8. A Design Intervention: Designing for Circularity

Our mission is to develop an educational experience that can enable leaders to design circular economies of exchange for products, services, and experiences engaging in systems thinking within cultural context.

Our ongoing research explores “life-serving leadership”. We educate leaders and designers to design triple bottom line strategies that benefit enterprises, human communities, and biosystems. We specifically investigate 7Ms:

1. What **mores** can support the **mission** to align economic growth goals with the thriving of human and biosystems?
2. What **mindsets**, **models**, and practice examples demonstrate that life-serving growth can also be profitable?
3. How can we develop **measures** frameworks that lead and manage material and non-material circular flows and assess what truly matters?
4. What **materials**, **methods,** and **media** are available to design for returns on investments that sustain human enterprises?

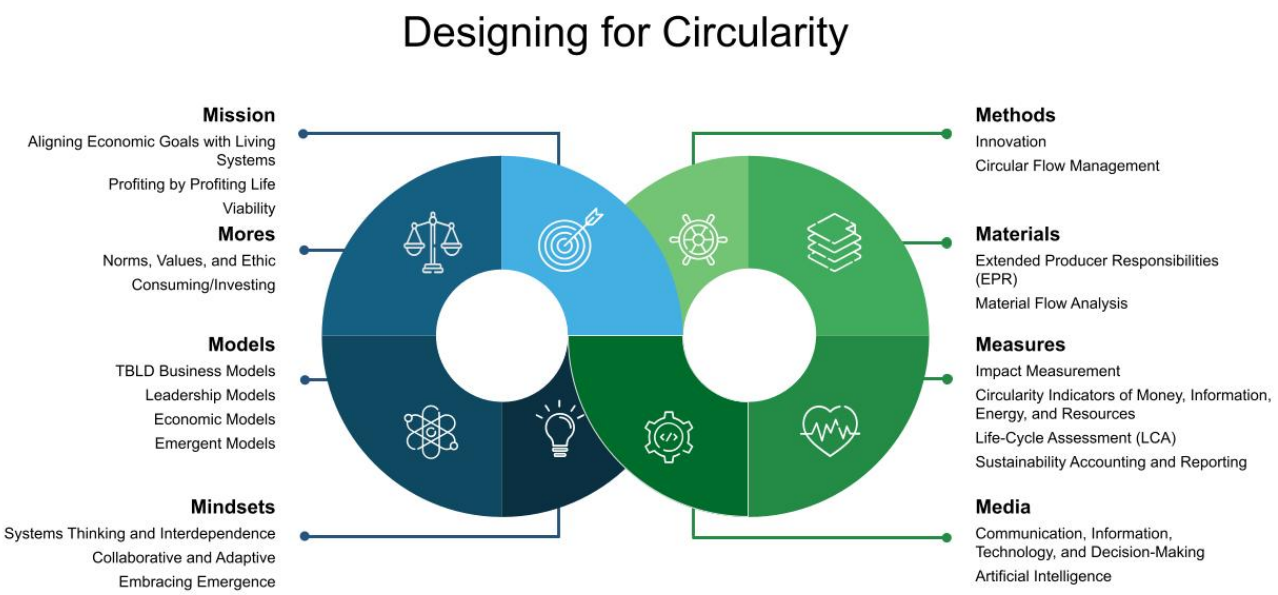

Figure 2. An illustration of the proposed framework on Designing for Circularity (Author, 2021).

10. Conclusions and Next Steps

We have entered the Age of the Anthropocene—a time when humanity can clearly see that the world around us has been shaped by our own ideas and designs. Now leaders must focus on creating conditions that sustain life rather than depleting resources for a short-term growth that shrinks the possibility of enterprise and species viability. Our ideas matter. Our designs matter. Our world is at stake. Having come full circle from devaluing design to depending on it, the time has come for ethical leadership by design.

Future versions of this study will integrate broader datasets and analysis to strengthen its conclusions. To be more specific, we will:

- Compare established programs and conduct case studies
- Form physical and digital study circles of facilitators and fellows through a 4D process guided by facilitated inquiry (See Appendix Table 1)
- Refine proposed mindsets, toolsets, skillsets (See Appendix Table 2)
- Outline plans for assessing the effectiveness of the program
- Launch pilot programs and collect feedback (Program Overview See Appendix Table 3)
- Discuss funding opportunities and potential collaborations with industry, government, corporations, and other educational partners

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Appendix

Table 1. 4D Process and Guided Inquiry

4D Process	Guided Inquiry
DISCOVER	1. How can we work with the emerging focus on circularity to develop ethical underpinnings for the design, leadership, and management of systems of commercial exchange? 2. How might we build transparency into decision-making processes, making the invisible dynamics of markets visible? 3. How might we design products, services, and experiences that provision both present and future human needs while sustaining the ecosystems that support life? 4. How might we enable profitability by ensuring mutual benefit to others and the world?
DEFINE	5. What is the current state of design education in sustainability and circularity? 6. Where are the gaps in existing curricula beyond materials and waste management? 7. What mindsets, toolsets, and skillsets are necessary for leaders in design-driven circularity? 8. How can a focus on circularity enable strategic and sustainable leadership by design? 9. Who are we serving? Where should we begin transitioning, and who should be our partners? Who are our educational and commercial partners?
DESIGN	10. What is the best way to design learning for diverse participants? 11. How can we assess participants' ability to apply what they've learned? 12. How do different disciplines, sectors, and geographic contexts influence the learning needs of existing and emerging leaders?
DELIVER	13. Where should we begin our pilot, and with which group and partners? 14. How will we define, monitor, and measure success? 15. How will we gather and use feedback to redesign and reimagine future iterations? 16. How and where can we scale the learning experience effectively?

Table 2. Mindsets Toolsets and Skills Sets for the proposed program

Mindsets	A set of beliefs and values that shape how an individual make sense of the world and self.	Systems Thinking; Interdependence Mindset Ethical Leadership Stewardship and Agency Regenerative Thinking Collaborative Mindset Adaptivity and Growth Mindset

		Cultural-Sensitive Approach
Tool Sets	The frameworks, methodologies, and instruments that support the application of skills in real-world settings.	Life Cycle Assessment (LCA) Material Flow Analysis (MFA) Cradle-to-Cradle Design (C2C) Closed-Loop Supply Chains Circularity Indicators Carbon Footprint Measurement Regenerative Business Design Regenerative and Sustainable Finance Life-Centered Innovation Stakeholder Mapping and Engagement Tools
Skillsets	The abilities, expertise, and competencies a leader develops to effectively apply knowledge and solve problems.	Strategic Sustainable Leadership Strategic Collaboration Entrepreneurship and Intrapreneurship Life-Centered Design; Zero-Waste Design Policy Advocacy Community Engagement Sustainability Accounting and Reporting

Table 3. Course Overview

Modules	Topics	Credit
1. Mission	Strategic and Sustainable Leadership: Creating systems of exchange toward the shared aim of sustaining life and living systems	2
2. Mores	Ethical Leadership	2
3. Models	Circular entrepreneurship and innovation	2
4. Mindsets	Designing a circular transition	2
5. Methods	Circular Design	2
6. Material	Material and non-material circular flows	2
7. Measures	Emerging Indicators that track the status of circular transition	2
8. Media	Technology, symbol system, and communication environment that influence the transition to the circular economy	2
9. Hybrid Residency/ Practicum	Leader learning journey with community partners and academic partners	2
		18 Total

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Empathy in Design | Physical Visualization as a creative approach to improve intercultural understanding.

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ABSTRACT | Empathy is essential in design, especially in intercultural contexts where misunderstandings can arise. At the Amsterdam University of Applied Sciences' CMD program, we developed a three-part workshop to foster empathy through physical visualization. By creating and exchanging tangible conversation objects, participants engage in active listening and meaningful dialogue. This approach enhances understanding by moving beyond verbal communication. Ultimately, it promotes respectful interactions and ethical thinking in design.

KEYWORDS | Foster empathy, Ethical approach in co-creation process, intercultural understanding, learning by making

1. Empathy in Design | Physical Visualization as a creative approach to improve intercultural understanding.

Communication and Multimedia Design (CMD) is a bachelor-level design program at the Amsterdam University of Applied Sciences (AUAS). In our learning community, we aim to develop a critical attitude toward the complex society we live in. Additionally, it is essential that we train our ethical thinking skills to navigate the challenges that arise from engaging with diverse socio-cultural backgrounds as designers.
We propose that ethical thinking starts with empathy – specifically, with understanding one another. We've noticed that in a design or co-creation process, misconceptions can easily arise. Often, we interpret things differently due to our varied backgrounds and

contexts.

This led us to our research question: How can you create a space for connecting and empathizing with the people involved in a design or co-creation process? Ideally, this would happen at the very beginning of the process.

To address this question, we developed an empathy-building approach structured as a three-part workshop:

- Part 1: Listening & Connecting
- Part 2: Making a Conversational Object
- Part 3: Exchanging and Reflecting

What stands out in this approach is its ability to foster empathy through the creation of a physical object. This tangible visualization facilitates conversation and encourages participants to share interpretations more openly. By using a conversation object rather than relying solely on words, the approach opens new pathways for active listening and meaningful exchange.

This creative method encourages exploration of interpretations, aiming to deepen understanding and appreciation of diverse perspectives. Ultimately, we hope this practice cultivates respectful interactions.

Figure 1. Three participants having an animated conversation during the workshop Empathy in Design, Cumulus Conference Monterrey 2024. They exchange their experiences by means of their self-made conversation pieces.

Figure 2. Participants interviewing each other during the workshop Empathy in Design, Cumulus Conference Monterrey 2024.

Figure 3. Two participants having a conversation during the workshop Empathy in Design, Cumulus Conference Monterrey 2024. They exchange their experiences by means of their self-made conversation piece.

Figure 4. Method cards from the Workshop Empathy in Design. Copyright: Pauline Hoogweg & Martha Lauría Baca

Figure 5. Participants exchanging their self-made conversation pieces during the workshop Empathy in Design, Cumulus Conference Monterrey 2024.

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Entrepreneurial Syntopia

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ABSTRACT | How can we redesign our dominant artificial global systems to align with our ecological ceiling and social foundation? This paper examines the entanglement of three dominant global systems—economics, corporate leadership, and industrial infrastructure—each driven by distinct but interconnected paradigms. These paradigms collectively strain the biosphere's regenerative capacity. In response, the paper proposes a strategic redesign of these artificial systems using Donella Meadows' 12 leverage points, specifically through entrepreneurial innovation by fostering physical, metaphysical, and metaphorical "synergistic islands" (syntopia) of regenerative economic, corporate, and industrial systemic structures. These synergistic islands, ethically connected by common biocentric outlook principles, seek to transcend or reduce considerably the corposphere's systemic dominance while influencing the econosphere and the technosphere to respect and operate within the means of our planet's ecological boundaries.

KEYWORDS | systemic design, co-design, entrepreneurial synergy, experiential foresight, biocentric ethos

1. Introduction

Human civilization faces a critical moment, dominated by three artificial systems—economics (the econosphere), corporate leadership (the corposphere), and industrial infrastructure (the technosphere)—which strain the biosphere's regenerative capacity.

Donella Meadows observed, "Systems cannot be controlled, but they can be designed and redesigned" (2001). Despite efforts to reform these systems since Limits to Growth's publication (1972), entrenched paradigms rooted in colonization, industrialization, and neoliberalism remain resistant to change.

Inspired by Buckminster Fuller's advice: "You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete," and John P. Allen's entrepreneurial ethos, this paper introduces the concept of 'syntopia': synergistic, semi-autonomous entrepreneurial societies prioritizing biocentric ethics. Syntopias serve as experimental 'islands,' providing an actionable, alternative strategy to redesign dominant human systems.

2. Historical Systemic Context

The entanglement of human civilization with the econosphere, the corposphere, and the technosphere, has deep historical roots shaped by ideological, technological, and geopolitical forces. These systems evolved through colonialism, industrialization, and neoliberalism, reorienting humanity's relationship with the biosphere.

2.1 From Colonialism to Consumerism

By aligning with emerging maritime empires like Portugal and Spain, the Catholic Church's missionary works (propaganda fide, 1622) laid the ideological groundwork for colonization. Figures like Vasco da Gama and Christopher Columbus contributed to transform spiritual conquest into territorial control.

The British and Dutch East India Companies (founded in 1600 and 1602) exemplified colonial prototypes of what became the corposphere. Colonized regions supplied raw materials, supported by infrastructures like ports and railways, which became the technosphere's foundations. Colonial wealth acquire through land spoliation of native populations, fueled the Industrial Revolution, embedding fossil-fueled mechanization enabling unprecedented production and resource extraction (Wallerstein, 1974; Pomeranz, 2000).

The introduction of electricity in the late 19th century transformed industry, urban life, and global communication. While Buckminster Fuller described electricity as a unifying force, creating efficiencies to "do more with less", it tied humanity to fossil-based energy systems entrenching industrial infrastructures in systemic dependencies on non-renewable resources that now strain the biosphere's limits.

The industrial economy required perpetual production and consumption, giving rise to consumerism. Strategies such as planned obsolescence ensured continuous demand.

Figures like Edward Bernays (1928), used psychological manipulation to stimulate consumer desires, reframing consumption as self-expression (Lebow 1955; Packard, 1957), embedding it within modern culture.

Simultaneously, industrial designer Raymond Loewy shaped consumer products to appeal emotionally beyond their functionalities, declaring, "The most beautiful curve is a rising sales graph," highlighting the link between aesthetics, and profits.

Neoliberal economists Friedrich Hayek and Milton Friedman aligned their economic theories with consumerism by "placing the market at the center of our social, political, and economic life" (Raworth, 2017), driving global adoption through think tanks and policies that reshaped governance while sidelining ecological and social concerns.

2.2 The Emergence of Ecological Limits' Awareness

As industrialization surged, concerns about humanity's impact on natural systems grew. In The Biosphere (1926), Vladimir Vernadsky presented Earth as a self-regulating, interconnected system shaped by life itself, challenging the anthropocentric views of Bacon's Novum Organum (1620) and Descartes' mechanical worldview (1637), which saw nature as inert and exploitable.

Buckminster Fuller's Operating Manual for Spaceship Earth (1969) further expanded Vernadsky's vision, emphasizing the Earth's delicate balance.

Humanity's evolving understanding of the Earth, shaped by events like the environmental movements of the 1960s, the rise of ecological science, and the space-age perspective of Earth from orbit, led to a profound shift in how we view our planet.

This culminated in Limits to Growth (1972), commissioned by the Club of Rome. Donella Meadows and her team used system dynamics to reveal the unsustainable trajectory of industrialization, highlighting the interconnected threats of resource depletion, pollution, and population growth.

3. Systemic Interdependence

Using Donella Meadows' systems-thinking framework, we examine how the interdependence of the econosphere, corposphere, and technosphere perpetuates unsustainable practices, shaping the sociosphere and straining the biosphere.

3.1 Econosphere:

Paradigm: The econosphere is driven by the belief in infinite growth, assuming Earth's resources are

inexhaustible
(Raworth, 2017).

Goals: Economic success is measured by GDP growth, which prioritizes market expansion over sustainability.

System Structure: Trade laws, taxation systems, and incentives favor efficiency and profit, often disregarding ecological limits.

Feedback Loops: Positive feedback in investment and consumption cycles reinforces resource extraction and economic dependence on growth.

Stocks and Flows: The econosphere controls capital, labor, and natural resources' trade, valuing their availability and movement, thereby dictating behaviors across systems. Within the sociosphere, the paradigm of 'infinite growth' morphs into 'infinite greed'.

3.2 Technosphere:

Paradigm: Assumption that industrial science can solve any ecological challenges (Merchant, 1980).

Goals: Efficiency aligns with economic productivity, heavily relying on finite energy sources.

System Structure: Fossil fuel-based infrastructures resist change due to prohibitive costs and coordination challenges.

Feedback Loops: Urbanization intensifies demand for construction materials such as steel and concrete, creating reinforcing feedback loops that escalate resource extraction, energy consumption, and associated environmental degradation.

Stocks and Flows: Energy and food systems rely on centralized, resource-intensive operations.

3.3 Corposphere:

Paradigm: Profit maximization dominates corporate decision-making (Friedman, 1970).

Goals: Corporations prioritize shareholder returns, often at the expense of social equity and ecology.

System Structure: Hierarchical corporate systems, driven by competition, influence policies and shape technological innovation.

Feedback Loops: Artificially created consumer demand sustains production, exacerbating resource consumption.

Together, these systems form an entrenched triad that perpetuates ecological degradation, requiring systemic redesign at their foundational leverage points.

4. The Paradigm Trap

Despite well-intentioned attempts to promote sustainability, entrenched paradigms resist significant change.

4.1 The Econosphere Paradigm

Kate Raworth's Doughnut Economics (2017) challenges the outdated growth model, proposing an economy that operates within ecological boundaries and ensures social equity. Raworth's "doughnut" visualizes prosperity as a space between social foundations and ecological ceilings.

In Design for a Better World (2023), Don Norman extends Raworth's model, using it as a "dashboard" to guide systems-level design thinking and encourage "humanity centered" designers to operate significantly closer to leadership positions in key fields such as economics and policy.

4.2 The Technosphere Paradigm

The Cradle to Cradle (C2C) framework, developed by Michael Braungart and William McDonough (2002), promotes designs where materials are endlessly reusable, distinguishing between "biological nutrients" (regenerative) and "technical nutrients" (restorative or recyclable). The framework has inspired related movements, such as the Ellen MacArthur Foundation's advocacy for the circular economy.

Despite the rise of disciplines like design for sustainability, transition design, and design beyond human, the technosphere's reliance on fossil fuels, extensive infrastructure, and deeply ingrained corpo-cultural habits remains a major obstacle to fully implementing these practices.

4.3 The Corposphere Paradigm

Corporate Social Responsibility (CSR) initially sought to balance profit with social and environmental accountability, often devolved into greenwashing. Peter Drucker's idea that "management is doing things right, but leadership is doing the right things" (1967) remains difficult to implement within profit-maximizing corporate models.

Otto Von Busch and Karl Palmas, in The Corruption of Co-Design (2023), critique the co-optation of participatory design principles by corporate agendas. They argue that such processes, while

appearing inclusive, are often instrumentalized to align stakeholder collaboration with profit motives rather than genuine systemic transformation.

The corposphere's required alignment with the econosphere perpetuates a paradigm in which sustainability is subordinated to profitability, complicating efforts to advance ethically meaningful, and sustainably impactful leadership.

These frameworks, though conceptually strong, often remain aspirational, hindered by entrenched structures and resistance from powerful interests. The challenge is not just about developing alternatives, but also creating the socio-cultural momentum to replace and redesign these global systems.

5. Syntopia: the Seed of a New Paradigm

This approach combines ethical leadership with sustainable world-building, rooted in biospheric science, guided by systemic design methodologies to develop a network of co-creative, interdependent communities aligned with a common ethos, aiming to eventually render the corposphere obsolete.

The concept of syntopia, "places that work together", coined by John Allen (2016) in response to Hans Ulrich Obrist's question about utopia, represents interconnected, synergistic spaces. It reflects Allen's lifelong understanding of 'synergy,' rooted in his background as an engineer and metallurgist, where the integration, and combination of forces, elements, or individuals generates outcomes that exceed the sum of their individual contributions.

Allen's most ambitious project, Biosphere 2, aimed to replicate Earth's biosphere as a self-sustaining ecological system. This groundbreaking experiment was also a masterclass in system design. Drawing from Ralph Abraham's Chaos Theory, Allen developed a unique management structure, dividing leadership into four "attractors" to foster cross-disciplinary collaboration between finance, design, architecture, and science. Positioned as a metaphorical "watchtower," he had access to all information without direct control over the system's feedback loops, reflecting his belief in synergistic teamwork where every individual's input contributed to the success of the whole.

By tracing its origins to Allen's interdisciplinary legacy, syntopia emerges as an inspirational seed for a potentially new paradigm merging ethical collaborative leadership with systemic design.

6. Syntopia: an Entrepreneurial Strategy

Entrepreneurship is traditionally viewed as identifying opportunities, mobilizing resources, and creating value to drive profit and economic growth (Schumpeter, 1934). Syntopias, in contrast, redefine entrepreneurship as a process of collaborative world-building and systemic design, where the aim is to create regenerative, self-sustaining systems in harmony with the planet. When

reframed through a sustainability lens, entrepreneurship emphasizes resilience, social equity, and ecological balance prioritizing the well-being of both human and non-human systems.

6.1 Conditions to Establish a Syntopia

To establish a syntopia, three conditions must be met: geographic autonomy, full self-sufficiency, and adherence to a biocentric ethical outlook. Remote locations such as floating platforms or deserts are ideal for testing these systems. Syntopias must operate independently from external systems, generating their own energy, water, and food. These communities can connect minimally with the econosphere and technosphere, to facilitate a transition to full autonomy.

6.2 Syntopias as 'Islands' of Sustainable Practices

Syntopias function as islands—physically or conceptually isolated from dominant systems. They emphasize regeneration, decentralization, and interdependence, differing drastically with colonial systems that exploit and control. Syntopias, in contrast, prioritize sustainability and equity, fostering long-term autonomy.

6.3 Energy Self-Sufficiency

Energy independence is key to syntopian autonomy. Renewable technologies like solar, wind, and wave energy are used to power these communities. Water is sourced from rainwater collection or micro-desalination, while food is produced locally through systems like aquaponics and permaculture.

6.4 Biocentrism: A Moral Framework

Syntopias operate under a biocentric ethos, emphasizing respect for biodiversity, interdependence, and finite resources (Watson, 2019). This framework guides every aspect of design, from resource management to community practices, ensuring sustainability and ethical leadership. This ethical framework, rooted in moral agent/moral subject principles, a concept articulated by ethicist Paul Taylor (1986), positions non-human life as having intrinsic value.

While syntopias are not isolated in the conventional sense, they are deeply embedded in the principles of sustainability and ethical leadership, ensuring that each system, material, and community is aligned with the larger vision of interdependence and resilience.

Should a syntopia fail, it can be absorbed by other successful syntopias, thus contributing to the network's diversity and growth. The experimental nature of entrepreneurial syntopias means that each one represents a unique initiative, and the lessons learned from one can be used to improve others.

7. Entrepreneurship for Sustainability & Resilience

Donella Meadows, in her 1999 lecture on sustainability, cited Herman Daly's Laws to design systems within Earth's ecological limits:

- Every RENEWABLE RESOURCE must be used at or before the rate at which it can regenerate itself.
- Every NONRENEWABLE RESOURCE must be used at or below the rate at which a renewable substitute can be developed.
- Every POLLUTION STREAM must be remitted at or below the rate at which it can be absorbed or made harmless.

She then added a fourth law, we can now call Meadows' Law:

- To be SOCIALLY SUSTAINABLE, capital stocks and resources flow must be EQUITABLY DISTRIBUTED and SUFFICIENT to provide a good life for everyone.

Meadows' fourth law echoes Buckminster Fuller's advocacy for equitable resource distribution (Fuller, 1969), emphasizing fairness as a guiding principle for true sustainability.

The ecological law of finite resources (Watson, 2019) emphasizes that ecosystems, and the entire biosphere, are constrained by limited resources, defining their carrying capacity. When any species overconsumes—whether due to population growth, greed, or inefficiency—it diminishes the capacity of other species to survive. This principle calls for a profound shift in how humanity manages both renewable and nonrenewable resources.

Building on this understanding of sustainability, let us examine real-world examples of communities and technologies that embody this redefined approach to entrepreneurship.

In 1969, John Allen established Synergia Ranch, which became an incubator for several entrepreneurial ventures that later informed projects such as Biosphere 2, and the research vessel Heraclitus, and led to the formation of the Institute of Ecotechnics.

In the 1970s, architect Michael Reynolds pioneered the Earthship community, creating autonomous homes made from recycled materials like tires and bottles. Designed for self-sufficiency in energy, water, and food, Earthships demonstrated the feasibility of off-grid living (Prinz, 2015). Despite facing regulatory hurdles, they showed the potential of innovative entrepreneurship to push the boundaries of sustainability.

Looking at indigenous communities provides valuable insights into self-reliance and ecological stewardship. One such example is the Sentinelese, one of the most isolated tribes in the world, who have maintained their way of life on North Sentinel Island in the Andaman archipelago, living without contact with modern society and relying on fishing and foraging.

Similarly, the people of Ganvié, a village in Benin built entirely on stilts, adapted to their environment when they moved onto the lake to escape slave raids in the 16th and 17th centuries.

The Mad'an people, who once thrived in the Mesopotamian marshlands, sustained themselves

through floating reed house construction, fishing, and date palm cultivation.

However, these communities are now facing increasing threats from climate change and resource exploitation, highlighting the importance of resilience, autonomy, and the need for strategic adaptation in the face of external pressures.

Designer and academic Julia Watson, in her book Lo-Tek: Design by Radical Indigenism (2019), argues for the incorporation of indigenous knowledge systems into modern design practices to address sustainability challenges. Her work emphasizes how traditional ecological wisdom can offer scalable solutions to contemporary environmental issues.

The Biosphere Experience, a Parisian experiment in low-tech self-sufficiency led by Caroline Pultz and Corentin de Chatelperron (2023), demonstrates that the core tenets of syntopian entrepreneurship—full autonomy in energy, water, food, and even garments production—can be successfully integrated into the heart of the technosphere.

Creating sustainable, autonomous systems is both complex and difficult. As seen with these examples, ideological, economic, and geopolitical forces often shape outcomes. Geographic isolation, resource independence, and strategic interdependence become crucial principles to design a Syntopia. Floating syntopias in international waters, for instance, provide a buffer from global pressures, while their interdependence enhances resilience, fosters innovation, and ensures long-term sustainability.

8. Designing a Syntopia

Designing a syntopia is greatly enhanced by using scenarios, which concretely illustrate abstract concepts and demonstrate how principles can be applied in specific contexts.

8.1 The Bajau People

The Bajau, known as "sea nomads," are an Indigenous maritime community in Southeast Asia. Traditionally living on boats or stilt houses, their survival relies on sustainable fishing and marine foraging. However, modern challenges, including statelessness, marginalization, and environmental degradation, threaten their way of life. Despite these issues, the Bajau possess invaluable cultural and ecological knowledge, making them an ideal community for piloting an oceanic syntopia.

8.2 Establishing Co-Design Conditions

By building trust through NGOs already assisting the Bajau, co-designing conditions would be established using humanitarian designer Georg Hoehne's methodology:

Thinking Locally: Solutions must align with Bajau traditions and environmental realities, focusing on marine resources and autonomy.

Transfer of Ownership: Ensuring Bajau-led governance fosters independence and resilience.

Leveraging Local Creativity: Repurposing ocean plastics and coastal waste into infrastructure engages local artisans and promotes sustainable innovation.

Community-Led Problem Definition: Participatory workshops identify priorities like clean water, sustainable fishing, and renewable energy.

This approach ensures the syntopia evolves organically, rooted in the Bajau's lived experiences and aspirations.

8.3 Phase 1: Experiencing Foresight

Experiential foresight connects communities to potential futures, fostering ownership and agency (Press et al., 2024). For the Bajau, tools like cognitive sandboxes and participatory games can facilitate this process.

Drawing inspiration from the Machi Wachi board game, created by designers Taqi Shaheen and Sara Khan Pathan to support the Bhit Island communities in Pakistan, a similar approach could be used to engage the Bajau in envisioning their syntopia. A floating school could serve as the foundational hub, integrating education with sustainable innovation. Through collaborative games and creative exploration, the community could actively identify and prioritize sustainable practices tailored to their needs.

8.4 Phase 2: Real World Building

With the successful establishment of the floating school, the Bajau community begins to coalesce around it evolving into a floating village, incorporating ethical experiments and sustainable technologies. Each new floating island becomes an extension of this system, fostering resilience and interdependence.

To guide the expansion of this community, various ideation techniques like ‘reversing assumptions’ challenging conventional thinking, metaphorical exercises, such as likening the floating school to a coral reef, emphasize interconnectedness and sustainability. Tools like Jet Gispen’s Moral Agent card game can help establish ethical governance, ensuring decisions reflect community values.

The floating school becomes the center of a fractal evolution, with each new floating island representing a branch of the original idea, continuously expanding and improving upon its design

8.5 Phase 3: Scaling Resilience

As the syntopia expands, managing complexity becomes critical. Simulation tools like digital twins allow communities to model and optimize systems. The Virtual Singapore project, supported by Bentley Systems, demonstrates how digital twins integrate urban planning, environmental simulations, and real-time data for sustainable governance.

For the Bajau syntopia, digital twins could manage energy, food, and water systems while monitoring marine biodiversity and underwater vertical farming. Upcycling discarded electronics fosters innovation while maintaining self-reliance, blending advanced technology, simulations and management games with local creativity.

This iterative approach ensures the syntopia evolves thoughtfully, balancing ecological harmony and community resilience.

9. Conclusion

The Bajau syntopia scenario demonstrates how self-sustaining communities can redefine humanity's relationship with the planet. Rooted in biocentric ethics and systemic design, syntopias bypass entrenched global systems, prioritizing regeneration and autonomy. Through collaborative planning, ethical innovation, and advanced tools, they offer a blueprint for sustainable futures. While challenges from external systems and internal conflicts persist, defense mechanisms like geographic isolation and interdependent networks strengthen resilience.

Looking ahead, syntopias could flourish as sanctuaries of sustainable innovation hubs, paving the way for future land-based initiatives aligning with the biosphere's limits.

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ETHICAL LEADERSHIP IN DESIGN-LED ENTREPRENEURSHIP: A SCENARIO-BASED STUDY OF THE CHIEF DESIGN OFFICER COMPETENCY MODEL

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ABSTRACT | With the rise of design-led entrepreneurship, Chief Design Officers (CDOs) play a key role in bridging design and business, driving organizational innovation, and implementing ethical leadership. Despite the significance of CDOs, their capabilities and unique value in this context remain underexplored. This study examines the capability development of CDOs in the process of transformation from designer to entrepreneurial leader. Based on the mixed research involving 21 Chinese design entrepreneurs, we developed a competency model containing eight core dimensions, in which ethical leadership emerges as a strategic capability founded on aesthetic, empathy, coopetition, and collaboration capabilities. This strategic capability effectively links creative, foresight and insight. Research reveals that design entrepreneurs prioritize the practice of ethical values and consistently operationalizes ethical leadership to achieve business success. CDOs address leadership challenges through ethical practices, fair value-negotiation and sustainable strategies that balance business and social values. The scenario-based architecture presented in this study provides a new perspective on the capability requirements and cultivation of CDOs, guiding and providing foresight for future design entrepreneurial practices. They illuminate actionable pathways for developing ethical leadership and promoting sustainable development through design-led entrepreneurship. By fostering a deeper understanding of the capabilities and ethical considerations crucial to the success of CDOs, this research contributes to the advancement of design-led entrepreneurship and its potential to drive positive change in organizations and society at large.

KEYWORDS | DESIGN-DRIVEN ENTREPRENEURSHIP, ETHICAL LEADERSHIP, CHIEF DESIGN OFFICER, COMPETENCY MODEL, INTERCULTURAL DESIGN

1. Introduction

The human-centric paradigm in contemporary design entrepreneurship is catalyzing tectonic shifts across industries in consumer technology, advanced manufacturing and other fields (Buchanan,2019). In this context, the chief design officer (CDO), as the core of strategic decision-making, has become a key role in balancing business objectives and social responsibility by driving product service system construction and brand value building by design. In the future, as the influence of design in business and society continues to expand, the strategic position and role of chief design officers will become more and more important, and their ethical leadership will directly have a profound impact on the design decisions of organizations, team management and corporate social responsibility (d'Anjou, 2010).

In the process of deep transformation of designers to chief design officers and entrepreneurial leaders, they need to overcome the ability gaps in strategic thinking, commercial convergence, team collaboration management, decision risk management, brand and market operation (Kolko,2018). This transformation is not only the expansion of professional skills, but also the reshaping of the way of thinking. The current research on chief design officer's ability has achieved important results in the aspects of design and business integration, user insight, team management, but there are still shortcomings in the aspects of systematic construction, meta-cognitive awareness, regional cultural differences (Borja, 2006). At the same time, we can see that the practice of ethical leadership in design entrepreneurship faces multiple challenges, including conflict of interest, rapid decision-making pressure, team culture conflict and the balance of social responsibility (Chan, 2018). These challenges are particularly acute in the Chinese context, where the unique nature of social values and technological ecology require the CDO competency framework to be culturally sensitive and dynamically modified.

Our mixed-methods inquiry addresses the lacunae through two-phase investigation (qualitative interview + scenario foresight workshop), a three-level coding analysis is conducted on 21 entrepreneurs, and an eight-dimensional competence model including ethical leadership is extracted. MLP (multi-level perspective) and CLA (causal stratification analysis) tools are used to verify their adaptability in scenarios such as technology ethics and policy abrupt changes. This study contributes to design leadership discourse by proposing practical framework for the cultivation of local CDO and promoting the evolution of design leadership theory to the symbiotic paradigm of "ethic-business-culture".

2. Related work

2.1. Design-driven entrepreneurship and ethical turn

The evolution of design-driven Innovation theory, pioneered by Verganti (2009) and advanced through institutional practices like IDEO's design thinking methodology, has progressively shifted from product-centric aesthetics to strategic-level foresight. This paradigm positions design not merely as responsive to user needs but as actively shaping future market trajectories–a transition exemplified by Apple's ecosystem architecture and Airbnb's service model reinvention. The Sustainable Development Goals (SDGs) have further catalyzed an ethical inflection point, compelling CDOs to evolve from creative executors to strategic integrators who reconcile commercial objectives with socio-environmental imperatives. This role balances knowledge ecosystem integration with insight into future needs. Although the "design-oriented scenario" proposed by Manzini (2015) introduces scenario planning tools into the field of social innovation, its macro perspective is difficult to adapt to the resource constraints of start-ups.

The conflict between design ethics and business objectives is particularly significant in rapid iteration scenarios, for example, the conflict between data privacy and business model innovation has not been systematically resolved. Ethical leadership, defined as "demonstrating normative and appropriate behavior through personal behavior and interpersonal relationships" (Brown et al., 2005), is critical in design-led businesses because decisions often

involve trade-offs between profit, user needs, and social impact. In an entrepreneurial setting, CDOs must simultaneously act as innovators, negotiators, and ethical managers - a multidimensional role that requires capabilities beyond traditional design management (Kimbell, 2011).

2.2. Interdisciplinary dilemmas of situational tools and ethical decision-making

As a shared tool of management and design, scenario planning plays a bridging role between macro trends and micro practices. The Design Council's leadership framework (2018), despite advancing visionary thinking metrics, overlooks individual-level ethical foresight cultivation. Its mature organizational orientation ignores the multi-dimensional challenges of start-ups - CDOs need to simultaneously act as innovators, negotiators and ethical managers. The study of ethical leadership also faces interdisciplinary fault. Brown et al.'s ethical leadership model (2005) emphasizes normative behavior and social responsibility, but does not resolve the unique contradictions in the design scenario. The limitations of the existing framework are threefold: (1) It treats ethics as a separate domain rather than an endogenous element of design leadership; (2) Ignoring the ability to predict ethical-business conflicts at the individual level; (3) Lack of dynamic responses to technological changes and cultural differences.

2.3. Iterative demands on competency model

Contemporary competency frameworks require radical reconfiguration to address design leadership's evolving demands. The founders of environmental brand Patagonia (Patagonia, 2022), for example, design products that promote sustainability with ethics at their core. The concept of ethical leadership and its training path, in the current background of design-driven entrepreneurship, are an interdisciplinary integration opportunity for the development of design ethics (Hamington,2019). Boyatzis' (1982) Iceberg competency model, which distinguishes between surface skills and deeper traits, provides a foundational framework for analyzing leadership development. Recent research on entrepreneurship has highlighted the need for future-oriented skills, such as adaptability to technological change and to "weak signals" of emerging trends (Kononiuk et al., 2017). The European Commission (2006) of Reference for Key Competencies further identifies "initiative and entrepreneurship" as essential to managing uncertainty. However, these models lack specificity for design leaders, especially when it comes to combining ethical reasoning with entrepreneurial agility.

3. Method

3.1. Data acquisition and coding process

This study employed a three-stage thematic coding analysis targeting design entrepreneurs in China's consumer goods (38%), advanced manufacturing (33%), and information technology (24%) sectors. The sample comprised 21 decision-makers from startups valued between RMB 25-200 million, all undergoing second-generation product iteration cycles. Participants included C-suite executives and senior managers, with data collected through semi-structured interviews (mean duration: 90 minutes) and scenario-based workshops.

The interview focuses on the impact of design background on decision-making and the dilemma of ethical leadership practice. The interview outline is in Appendix I, and the basic information of the interviewees is in Appendix II. To ensure coding rigor, two researchers independently conducted line-by-line text analysis. Initial codebook calibration occurred after six interviews text, establishing consensus on the code definitions and application criteria. Subsequent coordination sessions followed each new thematic emergence. Discrepancies in coded segments were resolved through iterative discussions until unanimous agreement was reached. Inter-coder reliability, measured by percentage agreement across all coded units,

achieved 92.4% consistency. 157 initial concepts were extracted and summarized into 31 core themes. Based on topic saturation test (when sample size ≥16, new themes tend to zero. Over 80% coverage) to ensure data adequacy (Guest et al., 2006), see Appendix III.
Axial coding revealed three constitutive dimensions governing design leadership efficacy (see Table 1). Six subordinate clusters emerged through constant comparison.

Table 1. Codebook

First level	Second level	Third level	No. of material sources	No. of reference points
Impact of design background	Effective communication and collaboration	Empathy	10	18
		Collecting and sorting out information	6	8
		Strong communication skills	5	8
		Create good creative space	7	10
	Human-centered design thinking	Logic and construction	2	3
		Rich user perspective	8	16
		Creative problem solving	5	7
		Unique way of thinking	3	6
		The ability to identify and solve problems	5	7
		User Thinking	8	14
Advantages of design entrepreneurs	Aesthetic Conviction	Professional background	2	2
		Individual expression	6	17
		Sensitivity to design	2	3
	Cross-field experience integration	Accurate analysis of industry situation	4	7
		Integration of resources	9	13
		Flexible in optimizing products and business	9	25
		Flat Managed creative space	2	3
Balancing competencies and gaps	Innovation and creation with value	Good at iterating and optimizing	9	18
		Novel expression of output form and content	8	24
		Able to find new opportunities	4	4
		Relationship between people and nature	1	3
		Active iteration	4	6

	Open, diverse and inclusive	7	10
Strategic reflection and foresight	Clearer personal/ company positioning	6	9
	Reflection ability	7	11
	Broad horizon	3	6
	Integration of resources	5	12
	Innovative Strategy	8	14
	Insight	10	18
	Corporate Vision and Mission	8	17

Through systematic coding analysis, six distinctive competitive advantages emerged as defining characteristics of design-driven entrepreneurial leadership.

First, design entrepreneurs demonstrate effective communication and collaboration throughout the product design and requirements delivery process. They place rigorous emphasis on internal communication, ensuring team members have a comprehensive understanding of design concepts and schemes. They value team members' opinions and respect designers' commitment to the integrity and originality of design concepts. Design entrepreneurs exhibit empathy-oriented design thinking, anticipating latent user needs and product application scenarios from the user's perspective. They engage in forward-looking thinking about profound user needs and the interaction between people, society, and ecology. Aesthetic sensibility permeates the entire innovation and creation process for entrepreneurs with design backgrounds. They prioritize product design, attention to detail, and the pursuit of beauty. They consciously cultivate an aesthetic sensibility within themselves and their teams to sustain the vitality of design and creativity. Design entrepreneurs also possess cross-disciplinary integration capabilities, often drawing from multi-disciplinary backgrounds and knowledge reserves. This enables them to engage in effective coopetition - simultaneously cooperating and competing with others. They master the professional knowledge required for the product's core processes while demonstrating strong humanistic and artistic literacy. They continuously understand and integrate knowledge from diverse fields, leveraging the complementarity of team members' disciplinary expertise.

In terms of innovation and creation, design entrepreneurs are not only limited to introducing new forms of presentation into emerging industries but also pay more attention to thinking about underlying issues such as product demand and use scenarios. This allows them to logically determine the direction of product innovation, differentiating the enterprises they create from others through creativity. Design entrepreneurs exhibit outstanding strategic reflection and foresight, particularly in risk identification and response. Their composure and long-term perspective are crucial for navigating the strategic adjustments enterprises face from inception to maturity.

3.2. Scenario-based insights

In the dynamic market driven by capital flow, insight into market trends and accurate identification of customer pain points are crucial for start-ups to withstand market challenges. Only 9.5% of respondents self-rated as having "industry situation research ability," indicating a stronger capacity to discover new opportunities and a heightened sensitivity to shifting social trends. Design entrepreneurs often lack the tools to link trend analysis with product design, making it difficult to gain market insights through data collection, personal reflection, and other methods to conduct accurate industry research and judgment.

Survey data reveals that design entrepreneurs generally struggle to integrate innovative design with business strategy. They lack conscious consideration of the design-business relationship from a top-level perspective and fail to align product innovation with the company's overall business plan. While design entrepreneurs recognize that product design and innovation require the support of a reliable business model, fundamentally a matter of holistic enterprise resource integration and allocation, they often lack awareness that organizational leaders must transform innovative ideas into sustainable production and operation modes, striking a balance between innovation and business in product design. However, the survey also indicates that entrepreneurs with a stronger sense of social responsibility tend to be more pragmatic and comprehensive in assessing the risks and feasibility of design schemes.

Respondents acknowledged a "lack of connection between innovative design and business operations". Initially, "gaps in business logic" and "inefficient resource allocation" were classified as capability gaps, manifesting as an excessive focus on product innovation, neglect of cost control and profit model design, and a lack of understanding of fundamental business modules such as supply chain management and financial risk. Although ethical leadership was identified as a strategic capability, interviews revealed a "lack of an actionable framework for ethical decision-making". Only 24% of respondents mentioned "data ethics" or "transparent oversight mechanisms."

Building upon the six strengths and two weaknesses identified above and informed by scenario foresight interventions, this paper argues that the CDO capability model must emphasize ethical leadership, not merely as a conceptual extension of design leadership but as an explicit capability characterization. As a core decision-maker, the CDO's conceived product service system requires not only usable products based on user experience and technology roadmap development but also market brand alignment with the organization's vision, social responsibility, and medium- to long-term development goals. Consequently, this paper proposes eight core capabilities: aesthetic, empathy, competitive force, collaboration, innovation, foresight, insight, and ethical leadership, forming the foundation of an initial CDO capability model.

3.3. Scenario workshop verification

This study organized an online scenario workshop with the theme of "Future Vision and Service Experience in the Automotive metaverse" to verify the practical value and dynamic adaptability of the Chief Design Officer (CDO) competency model. Participants included 5 design entrepreneurs in the field of transportation (all from the previous in-depth interview respondents) and 15 graduate students in design, and simulated multiple decision-making roles in real business scenarios through mixed grouping across experience and academic background. Using Scenario Foresight and foresight tools such as MLP and CLA, the workshop focuses on the synergy of ethical leadership, collaboration and foresight to validate the adaptability of models in complex business environments.

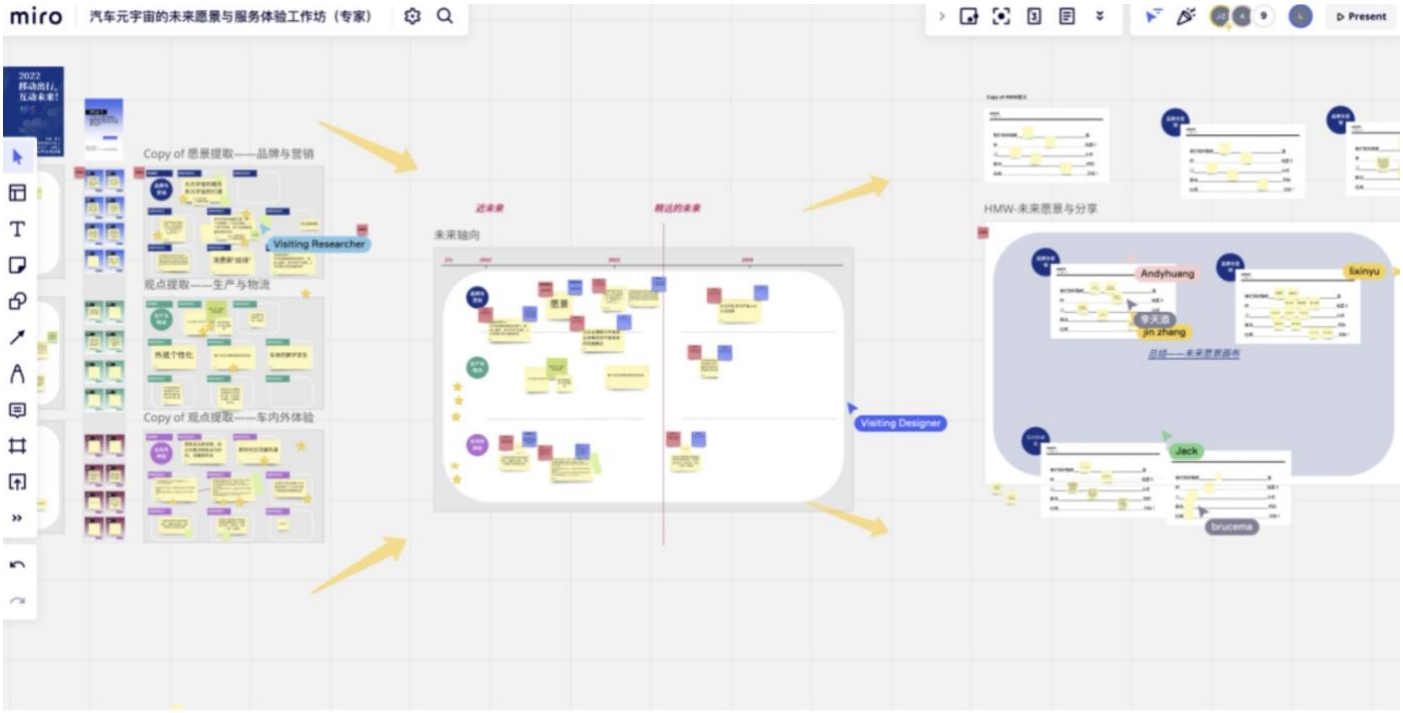

Fig 1. Workshop online co-creation board

The workshop was divided into 3 sessions and lasted 4 hours:

Scenario construction (1.5 hours) Based on the MLP framework, participants from the macro (social trends, policies and regulations), medium (industry ecology, technological innovation), micro (user behavior, product services) three levels, jointly build the 2030 "automotive metaverse" four potential scenarios, each group through the Miro whiteboard visualization of the scene map. Note key drivers (e.g., AI ethics, privacy awareness) and their interactions.

Capability Mapping and Decision Simulation (2 hours) For each scenario, participants role-play based on the CDO capability model. Each team is required to submit specific decision plans (such as ethical review process, technical roadmap adjustments) and undergo cross-questioning to simulate real business negotiation scenarios.

Feedback and model iteration (0.5 hour) 20 participants evaluated the validity of the competency model through an anonymous questionnaire (Likert 5 subscale) and focus group discussion. The core indicators of the questionnaire include: the coverage of the competence dimension to the decision demand (mean 4.2/5); The synergy of ethical leadership with other competencies (mean 4.5/5); The model's fitness to dynamic challenges (mean 3.8/5).

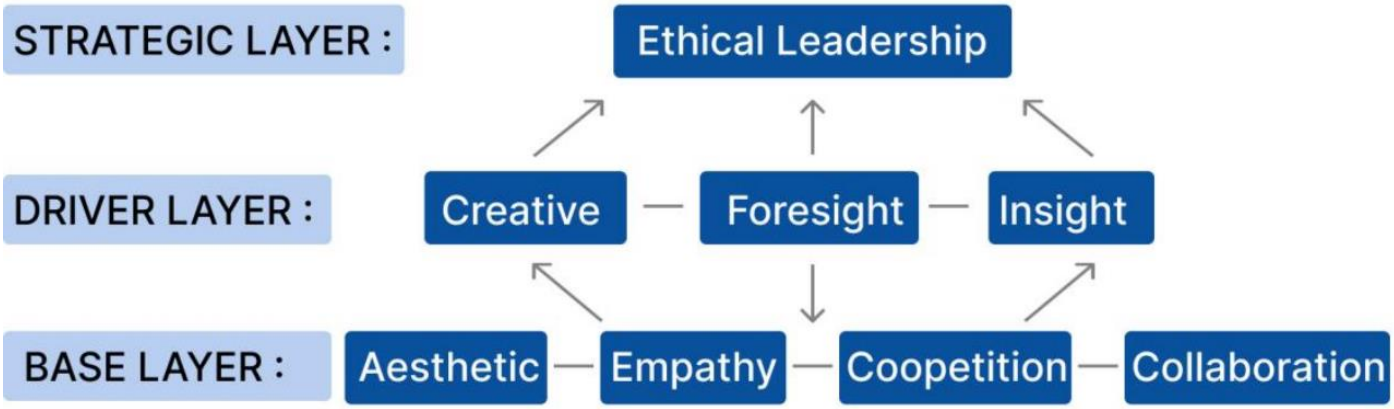

Fig 2. Competency linkage model

Based on the capability linkage diagram (Figure 2) extracted from the scenario workshop, the arrow represents the linkage relationship between capabilities, and intuitively presents the collaborative mechanism of ethical leadership as the core of strategy, driving innovation, foresight and collaboration capabilities. The results show that the CDO needs to achieve the

bidirectional fit of ethics and business objectives by dynamically balancing the base layer ability (Aesthetic, Empathy, Coopetition and Collaboration) and the driver layer ability (Creative, Foresight and Insight). This verification provides a simplified framework for the practical application of the model, and the subsequent research can further expand the scenario types to enhance the universality.

4. Discussion

4.1. Adaptability of capability model in dynamic scenarios

Situational workshop validation reveals significant limitations in existing competence models when addressing ethical conflicts in technology, such as data monopoly scenarios. Despite the positioning of ethical leadership as a strategic core, respondents generally lack actionable ethical decision-making tools (e.g., data ethics assessment matrices, stakeholder value maps). For example, in automotive metaverse simulation decisions, design entrepreneurs tend to rely more on personal intuition than on a systemic framework, resulting in an imbalance between commercial feasibility and social responsibility. This contradiction highlights the disconnect between ethical leadership and business insight in current models, which do not yet have a quantifiable linkage.

4.2. The differentiated shaping of ethical leadership by situations

In-depth interviews show that Chinese mainland design entrepreneurs exhibit a significant policy-oriented and localization tendency in their cognition of ethical issues. For example, 57% of respondents included a "dual-carbon goal" in their product design ethics framework, while only 9% mentioned globalization issues. Respondents from non-founder backgrounds are limited by their job responsibilities and lack awareness of the process of integrating design into corporate strategy to create long-term value. Moreover, this reflects respondents' one-sided understanding of the nature of their cultural situation, leading to a lack of confidence in design leadership's ability to promote team collaboration and cultural shaping, and diminishes the expected role and value of ethical leadership in their capability-building process. As a strategic core, ethical leadership needs to enhance its synergy with other capabilities through an instrumental framework.

4.3. Interdisciplinary education breakdown and ability training path reconstruction

Design entrepreneurs in the survey group, particularly start-up founders with design backgrounds, constitute a predictable research group. Overall, respondents are facing a serious disconnection between practice and theory, lacking essential understanding of academic terms and cognition of literature achievements. The structural defects of design education are exposed. Currently, design courses still focus on the one-way link between creative output and user verification. Design schools rarely offer interdisciplinary courses such as business ethics and philosophy of technology, making it difficult for entrepreneurs to identify emerging ethical risks such as algorithm bias and data colonialism. And the lack of training scenarios of business-ethical-technology triangle coupling.

5. Conclusion

Through subject analysis, this study conducted semi-structured interviews with 21 founders and middle and senior managers from different industries. Open coding, axial coding and selective coding were adopted to identify six core advantages and two capability gaps of design entrepreneurs. On this basis, combined with the scenario prediction method, a capability model for the CDO is proposed, which includes eight abilities: Aesthetic, Empathy, Coopetition, Collaboration, Creative, Foresight, Insight, and Ethical leadership. Previous design leadership models emphasized organizational culture shaping, product process sustainability, organizational change. By introducing ethical leadership, the CDO competency model of

constructed in this research aims to balance short-term interests and long-term value, promote transparency and data supervision based on strategic management and ethical decision-making framework emphasized by the ethical leadership model. Greater emphasis is placed on cultivating an ethical culture and team consensus, combining data ethics and technological innovation, and establishing a multi-party collaboration platform. Scenario prediction and other methods can more effectively support the academic intersection between management and design, which is one of the important aspects of training designers, particularly design entrepreneurs, to develop their ability for the future.

The research finds that entrepreneurs with design background face the challenge of disconnection between theory and practice. Influenced by differences in educational background, practical experience and cultural cognition, they have a partial understanding of design management and design strategy, and lack the cognition of integrating design into corporate strategy to create long-term value. The CDO competency model in this study attempts to bridge the limitations of design leadership in different dimensions, and emphasizes the important role of ethical leadership in balancing business interests and social values. With increasing attention being paid to design thinking and corporate social responsibility, taking ethical leadership as the entry point of the cross-integration of management science and design science has important theoretical significance for cultivating future-oriented design entrepreneurs. Future research can be further deepened and improved in expanding sample size, developing quantitative assessment tools and expanding research objects.

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Appendix

1. The Chief Design Officer competency standard model constructs the project in-depth interview outline

Part I: Basic situation
1. Why did you choose to start or work in the field of digital innovation?
2. What is the field and content of your business?
3. What kind of person do you think you are? As the promoter/founder of the company
Part II: entrepreneurial motivation
one Why did you choose to start your own business or work in design? 【Internal factors, driven by external forces 】
[Internal factors] Personal ideal, income, character quality (willingness to take risks, courage to take risks, innovation drive, creativity, confidence, ability to withstand pressure, emphasis on logic/intuition, vision pattern, courage to face competition, acumen to find business opportunities, etc.), learning background, working experience (relevant job experience, cross-field working experience, founder, co-founder), Family experience, etc.
[Driven by external forces] capital, contacts, environment (campus, society), policies, business opportunities, entrepreneurial guidance, etc.
3. How many times have you started your own business? Or what previous occupations did you have?
4. What is the most critical factor that will ultimately determine your choice to start a business or pursue a career in design?
Part III: Company Development (Corporate vision, business growth, evolution process)
1. What is the corporate vision of your company?
2. What is the main business scope of your company? Which direction will the future take? What are the drivers of business development (e.g., innovation-driven, market-driven, entrepreneurial capability driven)?
3. What is the market competitiveness of your product/service? What are the main problems facing us now? What is the team responsible for solving the problem?
4. How do members of the design background influence team decisions when resolving issues involving ethical conflicts, such as user privacy versus business interests? Give an example of its ethical considerations.
Part IV: Advantages and abilities of design entrepreneurs or practitioners
1. How do you balance business goals with social responsibility (e.g., sustainability, fairness) through design thinking? Please refer to specific decision cases.
2. What qualities and abilities do you think future design entrepreneurs or practitioners should possess?
What positive impact do you think design thinking has had on individuals, companies, and society after you have started or worked successfully?
[Personal impact] How has design thinking impacted you personally while working in the field of digital innovation? In [value concept (consumption concept, family concept, marriage concept, financial concept, friend choice concept), professional ability, life status (personal charm, interpersonal relationship, heterosexual relationship), comprehensive quality] performance? 【Separate questioning 】· 【Interpersonal relationship 】Compared with your classmates and friends at the same time, what differences do you think you have? (Focusing on the changes in quantity, quality, and type of interpersonal relationships.)
What impact has design thinking had on your company? What is your performance in [strategic decision-making, organizational structure, employee relations, product

development, capital financing, etc.]?
[Business impact on society] What impact do you think companies in the field of digital innovation have on society? [Promoting industry development, promoting green, low-carbon, sustainable development, building a harmonious society, etc.] What performance?
Part V: Typical portrait of chief design officer, ability standard and relevant suggestions
1. According to your knowledge, what areas do you think are the areas that future design entrepreneurs or entrepreneurs can deeply cultivate?
2. As far as you know, you think that the current promoters or founders of companies in the digital field or design positions are familiar to executives
What typical traits do you often have?
3. In a rapidly changing market environment, how should CDOs address the dual ethical and business challenges through scenario foresight methods (such as constructing future business scenarios)?
4. How do you evaluate the current startup environment? What is your attitude toward the future startup environment?

2. Basic information of interviewees

P	Position	Industry
1	Founder	Mass consumption
2	Founder	Information technology
3	Founder	Advanced manufacturing
4	Design director	Advanced manufacturing
5	Founder	Information technology
6	Founder	Advanced manufacturing
7	Founder	Mass consumption
8	Head of Industrial Design	Information technology
9	Senior designer	Advanced manufacturing
10	Founder	Information technology
11	Founder	Information technology
12	Head of intelligent hardware Experience Design	Mass consumption
13	Founder	Advanced manufacturing
14	Founder	Life health
15	Founder	Mass consumption
16	Founder	Advanced manufacturing
17	Founder	Mass consumption
18	Asia Industrial Design Director	Advanced manufacturing
19	Founder	Mass consumption

20	Founder	Mass consumption
21	Director of IP and Product Development	Mass consumption

3. Topic saturation table

P	No. of code	No. of topics	No. of topics in Common with the previous interviewee	No. of emerging topics	Total No. of topics emerged	Coverage of the No. of topics
1	33	17			17	100.0
2	48	15	14	1	18	83.3
3	35	19	16	3	21	90.5
4	51	17	13	4	25	68.0
5	45	16	12	1	26	61.5
6	36	16	15	0	26	61.5
7	41	18	13	0	26	69.2
8	39	20	12	1	27	74.1
9	38	17	14	1	28	60.7
10	29	18	14	0	28	64.2
11	37	15	10	1	29	51.7
12	35	21	15	1	30	70.0
13	33	24	16	0	30	80.0
14	30	22	17	0	30	73.0
15	29	23	15	1	31	74.2
16	36	27	16	0	31	87.1
17	35	24	14	0	31	77.4
18	48	26	18	0	31	83.9
19	32	20	13	0	31	64.5
20	37	18	15	0	31	58.0
21	32	23	16	0	31	74.1
Average number of topics coverage for all cases						70.2

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Ethical Leadership in Design: Building Collaborative and Caring Frameworks for Challenging Academic Times.

Marty Maxwell Lane

University of Arkansas

ABSTRACT | This X-format session examines the preparedness of academic leaders in design to navigate and lead within unstable and disruptive contexts and proposes leadership frameworks that center collaboration and care. Scarcity of resources, hostile state politics, the approaching enrollment cliff, and the post-pandemic era of loneliness contribute to the current challenging academic culture, particularly within the United States. (O'Connell-Domenech, 2024; Essential Partners, 2023)

Drawing on research in management and organization, we note a call to shift from traditional hierarchical models to frameworks emphasizing self-organization, trust, and robust team dynamics (Rutkowska and Kaminska, 2020). However, many of the world's oldest organizations, including academia, remain bound to traditional, conformist, machine-like hierarchies (Hormess and Lawrence, 2020), fostering cultures that conflict with the methodologies needed for contemporary leadership.

Service designers work to anticipate and manage disruption and call attention to the emotional side of user experience (Beckers, 2020) through relational, empathetic, and systems thinking. Rooted in co-creation, service design aligns closely with the four core features of creating caring communities outlined in *The Care Manifesto*: mutual support, public space, shared resources, and local democracy (The Care Collective, 2020). By applying these four pillars to academic environments and using service design methods and core values, leaders can create transferable frameworks and strategies for care-centered leadership. This X-format session aims to discuss how we might co-create the conditions for caring, connected, and ethical communities prepared to meet today's challenges.

KEYWORDS | COLLABORATION, CARE, LEADERSHIP, FRAMEWORKS

1. An Uncertain Landscape

The landscape of higher education is increasingly defined by uncertainty as institutions are under immense pressure from external forces. Particularly within the United States, institutions are facing funding insecurities, shifting political landscapes, and inadequate support for faculty, creating an environment of disconnection and loneliness. (Berg and Seeber, 2016) As a result, institutions often resort to risk-averse administrative strategies that stifle innovation and trust. At the same time, faculty experience isolation, diminished agency, and a lack of institutional belonging.

2. Systemic Barriers to Collaboration and Care

This uncertain landscape perpetuates and amplifies already existing systemic barriers to collaboration and care within the academy. By identifying six primary pain points, we are able to see opportunities for potential interventions and a reimagining of how we create culture at work.

1. Faculty Isolation
   Faculty members experience increasing loneliness, which leads to a pervasive lack of trust in each other and our institutions.
2. Confusing and Shifting policy
   Frequent changes and ambiguity in federal, state, local, and institutional policies create distrust and confusion, particularly among new faculty.
3. Lack of Sense of Belonging
   Faculty are rarely acknowledged as whole people with unique identities, needs, and goals. As many faculty move away from well-established communities for new academic jobs, the time to nurture relationships outside of work is critical, yet often not supported through poor work boundaries.
4. Ineffective Onboarding
   High turnover rates lead to continuous onboarding processes that feel mechanical and task-oriented rather than fostering faculty empowerment and fresh perspectives.
5. Resistance to New Ideas
   A burnout-driven culture often prioritizes efficiency over innovation, and traditional ways of working may be presented as the expectation, all leading to resistance to new ideas and stifling creativity.
6. Lack of Collaborative Models
   Even when faculty are interested in new ways of working, they face a lack of clear collaborative structures that balance governance with non-hierarchical approaches.

These systemic barriers collectively undermine efforts to build a supportive and innovative academic environment, limiting opportunities for meaningful collaboration and sustainable care within academic communities.

3. Frameworks for Collaboration and Care

These systemic academic challenges require a shift from traditional models to frameworks that prioritize self-organization, trust, and robust team dynamics (Rutkowska and Kaminska, 2020), but few models exist. Service design offers us a pathway to address the emotional aspects of user needs through relational, empathetic, and systems thinking and leads to fostering collaboration and trust, but is dependent on identifying a framework appropriate to the problem at hand. Using *The Care Manifesto*'s four core features of creating caring communities—mutual support, public space, shared resources, and local democracy—as a framework while using service design methodologies, we can begin to reimagine our leadership decisions to prioritize collaboration and care within the academy. (The Care Collective, 2020). We can address many of the current academic challenges, as outlined in section one, through the four pillars of mutual support, public space, shared resources, and local democracy. In the session, we will discuss how one institution has applied the care-centered leadership in the following examples:

Mutual Support
Peer mentorship teams provide guidance and encouragement among colleagues while prioritizing transparency in sharing knowledge. This fosters a culture of openness and collective growth.

Public Space
Sharing research tools and spaces increases accessibility and collaboration across disciplines. Establishing third spaces within the workplace, such as cafes, encourages informal discussions and relationship-building.

Shared Resources
Providing access to tenure and promotion materials, as well as effective approaches to research, reduces stress for faculty on the tenure track. Sharing pedagogical resources strengthens teaching practices and innovation. Committing to anti-resource hoarding promotes a culture of generosity and ensures a community of collective success among faculty.

Local Democracy
Encouraging junior faculty in leadership roles, with support from senior administration, amplifies new voices and perspectives. Co-creating agendas and goals and flattening hierarchies in working groups fosters inclusivity and shared decision-making. Cultivating a culture of humility and shared governance strengthens trust and mutual respect within institutions.

It is imperative that leaders understand the significance of every decision they make and that they are all parts of a larger system. If we use a framework for each decision, it can ensure that we are working towards the culture we aim to create. Strategic decisions that anticipate how various users will be impacted by an outcome accumulate and lead to sustained collaborative and caring communities.

3. Reimagining Futures

During the X-format session, participants will examine the affordances of the *Care Manifesto* as a tool to reimagine academic leadership and the potential of this framework to improve leadership conditions for caring, connected, and ethical academic

communities. Focusing on mentorship, onboarding, and leadership training, participants will consider how each one may shift if viewed through the lens of the four pillars of caring communities: mutual support, public space, shared resources, and local democracy. (Care Collective, 2020). By applying these four pillars to academic environments and using service design methods and core values, leaders can create transferable frameworks and strategies for collaborative care-centered leadership.

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Author 1 add an author bio that describes research interests and main achievements in a maximum of 40 words. [LEAVE BLANK UNTIL FINAL ACCEPTANCE] [_P/RoD Author Bio and Acknowledgements]

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Ethical Leadership for Startup Product Design Firms

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ABSTRACT | Nowadays, when the concepts of global sustainable development and circular economy are becoming more and more prominent, cultural and creative products, as an important carrier of cultural inheritance and innovation, have far-reaching impacts on society, the environment and cultural inheritance through their design and production modes. In the fashion sector, fashion brands face a dominant pressure for ethical behavior (Lundblad and Davies, 2016); this pressure not only influences companies to cope with the social impacts of their operations, but also influences consumers to adhere to sustainable behaviors. Consumers are more inclined to adopt these behaviors when they believe that significant others support ethical fashion (King, 2011). However, many fashion brand product design companies in the current market that are driven by cultural and creative design are clearly under-driven by design, failing to result in market-driven product design instead failing to gain long-lasting emotional attachment with users. As a result, the product is quickly discarded and the brand cannot continue to grow. This paper uses a case study approach to select three Chinese long-termism fashion brands: "UOOSEE", "Related", and "MADE IN NATURE", to explore the role of ethical leadership in designing cultural and creative products and establishing a brand image and its impact on the product's cultural depth and emotional durability in the context of the circular economy and the heritage of traditional oriental culture. The study finds that Chinese people's

fixation on traditional morality and new-age symbolic translation can effectively construct

emotional links between products and users, which is conducive to the construction of a positive

brand image and effectively promotes the emotional durability of products for sustainable

development. The study suggests that cultural and creative product design should strengthen

the construction of ethical leadership, which, in addition to its great role in shaping the team

thought it also has a huge role in generating useful creative ideas. Future research could expand

the sample to further validate the generalizability of the hypotheses and explore the interaction

mechanisms between ethical leadership and other factors.

KEYWORDS | EHICAL LEADERSHIP; FASHION BRANDS; EASTERN CONTEXT; EMOTIONALLY DURABLE DESIGN

1. Introduction

The value attributes of products are often included in the development of product narrative design. People use objects to differentiate themselves from others, and designing for the emotional added value of products has become crucial in this current era. With the emergence of AI-assisted design, the reliance on fragmented information, and the global trend towards sustainability and circular economy concepts, collective action by all stakeholders to reshape our education system, remove barriers to sustainable consumption and facilitate sustainable business models is needed. consumption and facilitate sustainable business models is needed for lasting change. (Amira Mukendi, et al, 2020, p.41) Fashion brands' moral transgressions often lead to a lack of awareness of the need for sustainable development. moral transgressions often lead to unfavorable brand evaluations (e.g., negative perceptions of brand ethics), social media backlash, and even purchase boycotts (e.g., the use of “moral” or “moral” in a brand name). purchase boycotts (e.g., #toodirtytowear campaign against Levi's; Forbes, 2018) for consumers leading from the thinking, cognitive level to the emotional, perceptual level. Long-lasting emotions cannot be separated from the design of values and ethically relevant elements such as trust and respect. At the same time, people are influenced by fashion trends and tend to pursue new fashions, which is contrary to the durability of emotions. Therefore, to balance the relationship between the two, and how to realize the needs of both at the same time is the opportunity to carry out research in this paper. As an important carrier of cultural inheritance and innovation, the design and production of cultural creative products have a significant impact on society, the environment and cultural heritage. Chinese morality originates from people's traditional beliefs, which can be briefly summarized as the pursuit of “真” (true), “善” (kind) and “美” (beauty), and it is the criterion for being and doing things It is the criterion for doing things and the standard for measuring the quality of things. The so-called “ethical leadership” is “design for truth, design for goodness, design for beauty”. Many Chinese startups are trying to tap into traditional Chinese culture and incorporate it into modern product design, aiming to create innovative fashion and lifestyle brands that are culturally rich and sustainable. However, after all, the commercial marketing laws of the modern consumer context can lead to a practice that often

the existing research gap.

2. Theoretical basis and research hypotheses

2.1 Moral Leadership and Cultural and Creative Product Design

The four essential normative principles of ethical leader-ship, the so-called central ethical orientations: (1) humane orientation, (2) justice orientation, (3) responsibility and sustainability. All four central ethical orientations present established leadership attributes in general leadership. All four central ethical orientations present established leadership attributes in general leadership literature in the social sciences as well as in the social sciences. literature in the social sciences as well (e.g., Brown et al., 2005; Ferdig, 2007; Johnson, 2009; Kalshoven, Den Hartog, & De Hoogh, 2011). Contemporary leadership research focuses on theoretical discourse and neglects practical research in solving intractable problems in reality. Appropriate behavioral interpersonal relationships that demonstrate norms through personal demeanor and behavior and promote this behavior to followers through two-way communication. communication, reinforcement, and decision-making.Despite the importance of this issue, the body of social scientific research on ethical leadership still is rather small (see Brown & Treviño, 2006; Den Hartog & De Hoogh, 2009; Toor & Ofori, 2009; Treviño, Weaver, & Reynolds, 2006) and even less interdisciplinary research has been conducted on the role of ethical leadership in management in brand and product design. In the cultural and creative fields of product design, ethical leadership is reflected not only in the leader's personal moral character, but also in his or her guidance of team members and control over the direction of the product. From the design of symbols, products, services, and systems. This leadership can guide the designer to dig deeper into the moral elements and traditional culture in the design and integrate them into the product design, so as to improve the narrative ability of the product, and to realize the power of the product and the brand with a constant traditional moral kernel, and to achieve the The realm of everlasting emotion. Culture includes the customs, beliefs and social behaviors of a group, as well as their intellectual and artistic achievements, reflecting human nature and social practices. In the context of Chinese fashion, which emphasizes the unity of man and nature, and under the current conditions of material abundance, users need more emotional satisfaction beyond function. The driving force of design is the need to synchronize the construction of product narrative and brand influence. Startup product design companies, with their founders' cultural cultivation and ethical influence, can test the ethical impact of the Universal Declaration of Human Rights by building team trust, increasing team creativity, and

shaping the organization's morals and values, standards and cultural consensus are the key foundations for ethical impact, and the underpinning of all of this is ethical leadership.

2.2 Moral Leadership and Sustainable Brand Development

Users do not require or demand sustainable products (Yan, Hyllegard and Blaesi, 2012; Brewer, 2019a; Soto-Acosta, 2020, 2024; V at am anescu et al.,2022) . To apply ethical leadership in the design of cultural and creative products is to deepen the further spirituality of the product's cultural connotations while promoting sustainable development. Trevino, Brown, and Hartman found that ethical leadership is not only related to leader traits (honesty, integrity, and trustworthiness) and ethical behaviors (openness, caring, fairness, and ethical decision making), but also the importance of values. Values-based management (setting ethical standards rewards through communication and communication). Ethical leadership requires communication, principles and role modeling through the following effects to drive better understanding and application of sustainable design concepts in design teams. Critical to building public relations and gaining consumer trust, establishing some form of causality engages consumers, giving them more confidence in the value of the product and sustaining a long-term brand relationship. From the initial research phase to the selection and design of the media, it all depends on how well the market developer understands the values of the people they are targeting. The product is realized through styling, symbolism, and form, using semantics and semiotics as a guide to the product's symbolic system. The concept of branding is a modern construct of a negotiated relationship that is transaction-oriented and at the center of all business and marketing interactions. From a functional point of view, a brand is a name, design, logo or a feature of a service that distinguishes the goods and services of a merchant or group from its competitors. By generating a value

proposition, it encompasses functional, emotional, and self-symbolic meanings. Branding can be used as a political vehicle for a company to dispel a negative image or to express public goodwill. Brands are differentiated by differences in consumers' understanding and perception of the branded product and its utility; brands are ultimately psychological creations of the consumer. Brand symbols include six levels of meaning: brand characteristics, brand advantages, brand value, brand culture, brand personality, user feedback. The difficulty of branding lies in the driving force with which the relationship between culture, society and economy is linked. Ethical leadership, as a brand driver, gains meaning through style, image, and the transactions, interactions, revisions, adjustments, and disputes between the parties involved. While the value of a brand in business is created through constant change, the constant cornerstone is ethical leadership. That is, ethical leadership brings together actors on the corporate side, the design side and the consumer side. A brand is not a physical thing, it is a dynamic space that represents a strategic interaction.

2.3 Moral Leadership and Emotionally Sustainable Design

In recent years, brands have been widely and harshly criticized for exploiting political, environmental and social responsibility deficits for profit. Brands have in fact become powerful social practices, and their creators and owners should be aware of this and act responsibly. From a collective perspective, ethical leadership generates relational recognition that evokes positive psychological cues for the group. From an individual state, ethical leadership helps to generate moral self-resonance. Designers infuse this nobler emotion into their product design approach. This logical correlation allows the user to always feel the moral voice in the use of the product, which is where the value lies and the significance of ethical leadership as an enabler. This emotionally sustainable design not only strengthens the emotional bond between the user and the product, but also enhances the cultural depth and emotional longevity of the product, thus promoting its sustainability.

The brand characteristics of a product are developed and defined, and these characteristics become the basis for communicating its value to consumers, which in turn has an impact on all aspects of the product's appearance, packaging, and sales.In this sense, emotional sustainability capacity, which involves recognizing and In this sense, emotional sustainable capacity, which involves recognizing and managing emotions, could mediate the relationship between sustainable fashion knowledge and individual sustainable responsibility. paramount importance in translating knowledge into responsible behavior (Betzler et al., 2022). Sustainable fashion knowledge may lead to emotional responses such as guilt or satisfaction, which can influence subsequent purchasing. satisfaction, which can influence subsequent purchasing behaviors (Castagna et al., 2022). Emotionally durable design (EDD) is a design philosophy that aims to extend the life of a product. It enhances the appeal of a product by strengthening the emotional connection between the user and the product. Jonathan Chapman proposed a six-point empirical framework for Emotionally Durable Design (EDD) which includes narrative, detachment, surface, attachment, fiction, and consciousness, which are seen as key areas for extending the emotional durability of products. In addition, research by B., Van, P., Dzmitry, A., and Jon, M. reveals the product qualities needed to extend the emotional endurance of products in areas such as engagement, adaptation to user identity, spirituality, evocative memory, and reward. These theoretical tools provide the basis for ethical education. Designers create the 'right' product differentiation, which is their most important business capability. The future of the industry is concerned with the shift in roles between the traditional designer, the company and the consumer, and the axis of this shift is the most critical element.

3 Moral Leadership and Emotionally Sustainable Design

3.1 Research Methodology

The data for this study comes from field research conducted in Shanghai. Conduct research and cooperation through the research institutions of universities. This partnership allowed the focus of the study to be refined and additional information to be collected. The theoretical basis also includes the author's doctoral research.

The research methodology consisted of four main phases. The initial desk research phase was followed by a case study phase. This methodology was adopted in order to narrow down the scope of the study. The objectivity and representativeness of the research is guaranteed, as the topic and its applicability to analyze multiple variables in the original context as connecting case study methodology supports the generation of inductive theory.

Given that emotional permanence has not been fully explored in the design of fashion branded products in start-ups, this approach provides practical insights and encourages interpretive analysis.

3.2 Case study analysis

The research began with a desk study to map the sustainable design and production practices of companies related to the fashion industry in Shanghai, China. The study identified around 20 sustainable fashion brands covering the cultural and creative products and daily-use products sectors. Most of these brands are micro-enterprises or small and medium-sized enterprises (SMEs), focusing on cultural creativity and emotional design of products, including services and experiences. Four macro dimensions were derived from the organizational practices of these brands, highlighting an emotional sustainability strategy led by ethical leadership. Three brands were selected for in-depth case studies to examine how ethical leadership guides brand development. Data were collected through participant observation, offline interviews, and digital ethnography research methods. These case studies were used to systematically analyze and generalize the findings. These case studies reveal how ethical leadership distills cultural and ethical values into design concepts, embeds an emotional sustainability approach, and designs products through narrative, attachment, and other means based on sustainable design's low-impact resource use, low-waste design, and management of product lifespan and recycling resources. These strategies not only enhance sustainability but also support business growth. The research takes brand narratives as its object and the results can bring learnable implications for product form, aesthetics, construction, and semantics. The results of the study

contribute to the production practices of the fashion industry towards sustainable excess.

3.3 Case Study 1

The brand “UOOSEE”: contemporary reinvention of traditional materials

The use of nostalgic elements is common in advertising and fashion, and bicycle inner tubes are one such nostalgic element. Founded in 2022, “UOOSEE” is a brand that specializes in sustainable fashion and has pioneered the concept of “sustainability”. Using discarded bicycle inner tubes as raw materials, it creates hard-wearing, waterproof and cool bicycle inner tube backpacks. The brand's core philosophy of “Game of Life” encourages users to be bold players in their lives.

The embodiment of ethical leadership: “UOOSEE” practices sustainability through ethical leadership to unite teams and artisans. Initially inspired by Patagonia, an American outdoor brand, and inspired by its ethical leadership, Anita, the brand founder, decided to create a brand with an environmental theme. The brand demonstrates ethical leadership through: fair cooperation: establishing long-term partnerships with artisans to ensure their rights and interests; interest, providing consumers with skills training and marketing support; environmental philosophy: insisting on the use of sustainable recycled and discarded bicycle inner tubes to reduce the waste of resources; community building: building a vibrant community through the organization of offline events and an online podcast, “The Cliff” , spreading the spirit of “The Game of Life”; Emotional Sustainable Design: UOOSEE focuses on the background story of its products, introducing the products along with the production process so that consumers can feel the uniqueness and environmental value of the products. Through creative design and handmade production, it gives new life to discarded materials and conveys respect for human beings. Through this case, we can develop the revelation of the knowledge of germinating ideas, constructing and shaping communication, rhetorical patterns, memory points, and artistry. It is possible to make a transfer from cognitive rhetoric or directly refer to rhetorical models in the form of a three-step process of abstraction, contextualization, and continuity.

Figure 1. The "UOOSEE "brand uses recycled inner tubes from bicycles to make backpacks, which are produced by an entrepreneurial team formed through ethical leadership

3.4 Case studies 2

The " related" brand: a contemporary reconstruction of traditional relationships

From the view of sustainable fashion, feelings, emotions and beliefs change daily and sometimes more often (Todeschini et al., 2020; Buzzo and Abreu, 2019; McNeill and Moore, 2015). Founded by the mother of Chinese supermodel Chen Biege, "related" focuses on designing apparel products with emotional value and moral significance. The brand takes "related" as its core concept, emphasizing the connection between people and people, and between people and nature. Embodying a sense of moral value. The brand is mainly known and accepted by the public is the brand to save water resources with the characteristics of the new process and the story of 70-year-old women's entrepreneurship, from different dimensions to reflect the charm of moral leadership, physically guiding the public to reflect on fashion, attention to social and moral issues. The brand's design strategy of emotional durability is based on building long-term partnerships with artists and artisans in order to ensure their rights and interests in the creative process. This is a natural fit with the brand's philosophy of using eco-friendly materials in product design to minimize environmental impact and not burden the environment. Through environmental initiatives and public service activities, the brand develops a unique ethical image and wins the trust of consumers. The brand's multifaceted narrative and cross-border linkages with various events have become a powerful strategy to enhance users' emotional connection, especially when focusing on respecting elders and women's independence, and even including many redefinitions of concepts such as age.

Figure 2 The "related" brand, the re-entrepreneurship of three retired mothers, is "related" to sustainable courage and responsibility

3.5 Case Studies 3

“MADE IN NATURE brand: contemporary regeneration of traditional elements

Founded in 2015, “MADE IN NATURE” is an ethnic fashion brand that focuses on fusing local culture, traditional crafts and modern design. With “nature, humanity and handicraft” as its core elements, the brand is committed to integrating traditional Chinese handicrafts into modern life. By thinking in a fashionable way about the current people's retrospective thoughts about traditional nostalgia, it innovates, recreates and regenerates traditional products.” MADE IN NATURE” demonstrates ethical leadership by Taking Chinese calligraphy as the brand communication symbol, through the modern re-creation of traditional calligraphy, its expression of strong emotional tension shapes a distinctive brand image; Empowerment for craftsmen: the brand cooperates with craftsmen in depth, provides marketing channels and design support, helps them transform traditional skills into commercial value and increase income, embodies social responsibility for inheriting traditions, and wins moral reputation; Cultural Inheritance: By shooting documentaries and holding exhibitions, the brand records and spreads traditional handicrafts, letting more people understand traditional culture and the values behind it, shaping the brand's ethical image and reflecting the quality assurance of the brand's products; Public Welfare and Sustainable Development: The brand actively participates in public welfare activities, promotes the revitalization of rural culture, revitalizes the regional economy, and enhances the well-being of the people in the region with its design, expanding the moral influence of design in terms of mode. mode of expanding the moral influence of design.

Fig. 3. “MADE IN NATURE” leads the regeneration of Chinese folk crafts with morality and becomes the front wave of the “National Wave”.

4. Conclusions and Recommendations

This study confirms that there are successful cases of combining pop culture and emotional sustainability in contemporary Chinese fashion brand products represented by accessories, clothing, and cultural and creative products. It also confirms the key driving role of ethical leadership as the underlying logic in this linking relationship. It is further found that emerging fashion brand startups driven by design thinking can, through cross-media narrative design methods such as contemporary reconstruction of traditional materials, contemporary reconstruction of traditional relationships, and contemporary regeneration of traditional elements, translate the good culture of thrift, care, tolerance, support, and sustainability embedded in traditional morality, emotion, and cultural elements into symbols that resonate with contemporary people, and integrate them into the fashion industry, with the driving force of moral leadership. in the fashion industry. Driven by ethical leadership, product design can enhance cultural depth and emotional connotation, strengthen emotional durability, and promote sustainable development. Ethical leadership can effectively guide startup brand teams to work together as one, positively reflect traditional moral values, effectively inspire emotional resonance in users, and reduce product obsolescence and environmental impact.

Recommendations

To strengthen the cultivation of ethical leadership, especially the start-up fashion company design company is in the image building period, should be through training to develop ethical leadership and education, to guide the design lead to set up the correct values, to improve their moral influence. To deepen cultural exploration, the design process should explore the

relationship between local fashion trends and lifestyles, and combine traditional ethical and moral elements with modern design concepts to create classicized products with greater cultural depth and emotional durability, shaping them into classic brands. The company should adopt a sustainable development mindset that combines the above aspects and incorporates environmental protection and resource conservation throughout the product life cycle.

Future Research

In emerging economies, design is recognized as an important way to promote economic development in order to change the current status quo of being a source of cheap goods and a processing site for products designed by foreign design firms, and to develop local brands that are competitive in global fashion. Future research could be useful in revitalizing the manufacturing sector as a contributing factor to the new post-industrial economy. Future research should expand the sample size and explore the interaction between ethics and other factors. leadership and other factors, such as corporate culture and employee innovation, to provide a more comprehensive theoretical framework for sustainable design that can fully serve the innovative capacity of a firm and even a nation.

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ETHICAL LEADERSHIP OF ENGOS FROM A SYSTEMIC DESIGN PERSPECTIVE: A CASE STUDY OF THE YANGTZE RIVER IN CHINA AS A METAPHORICAL BOUNDARY FOR RIVER SUSTAINABLE DEVELOPMENT

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ABSTRACT | China's rapid economic growth has led to prominent environmental issues, including pollution, ecological imbalance, and biodiversity loss. Among them, the environmental impacts on the Yangtze River raise concerns. The Yangtze River, known as the 'Mother River of China', originates in the Qinghai-Tibet Plateau's hinterland and is the world's third-longest river. During significant historical evolution, especially in response to national policies and global environmental challenges, environmental non-governmental organisations (ENGOs) have transformed from peripheral players in environmental governance to influential participants and have adopted various strategies to collaborate with governments to formulate policies. Among the key ENGOs in China that have sprung up around the conservation of the Yangtze River, the Sichuan Green River Environmental Conservation Promotion Association (Green River), founded in 1995, is a prominent representative. The organisation's founder, Yang Xin, has a deep connection with the Yangtze River that began in 1986, when he was part of the first human expedition to raft the Yangtze. He has used his life to engage in dialogue with the Yangtze, which has existed for hundreds of millions of years (Li, 2006). Subsequently, after many in-depth investigations at the source of the Yangtze, he observed the fragility of the Yangtze River basin ecosystem and the severity of the pollution problem and established China's first non-governmental nature conservation station. Over the next 30 years, through his unique moral leadership, he rallied nearly 3,000 volunteers from cities across China to engage in environmental conservation actions at 15 conservation stations along the Yangtze River. The leadership principles of 'leading by example' and 'public participation' (S. Quick et al., 2022), which he advocated, have become critical forces in promoting

sustainable development in the Yangtze River Basin. This paper aims to explore the contribution of ethical leadership to transforming ENGOs from a multidisciplinary perspective, drawing on concepts from systemic design theory, ethical leadership, and metaphorical boundaries. The Yangtze River is a metaphorical boundary here, symbolising separation and connection. In a socio-cultural context, it delineates the boundaries of different experiences and provides new opportunities to cross boundaries and explore (Gara, 2022). This paper adopts a mixed-methods approach, combining systems thinking with design tools to conduct a multidimensional, multi-stakeholder analysis. Key data for the case study were obtained through semi-structured interviews and field research. The Yangtze River as a metaphorical boundary shows how to integrate the resources of the government, businesses, NGOs, and citizens to jointly address the complex challenges of Yangtze River ecological protection in the Chinese context, thus providing a new perspective on the development of ethical leadership for ENGOs and exploring the definition of a systemic design-led roadmap for desirable future trends in ecological conservation.

KEYWORDS | ETHICAL LEADERSHIP, ENGOS, GREEN RIVERS, SYSTEMIC DESIGN, YANGTZE RIVER, METAPHORS

1. Introduction

As Liu (2018) states, “Some studies have found that 90% of the global plastic waste entering the sea is concentrated in ten rivers, including China's Yangtze River.” The Yangtze is the longest river in China and the third longest in the world. Its source is in the Tanggula Mountains in Qinghai Province, where it collects the Chumar River system in the north, the Ulan Moron River system in the west and the Dangqu River system in the south. The Yangtze River is 6,397 kilometres long and has an annual runoff of 951.3 billion cubic metres (Guo et al., 2021). The Yangtze River and its tributaries run through 19 provinces (autonomous regions, municipalities directly under the central government) in China and finally converge in Shanghai into the Yellow and East China Sea. The total industrial and agricultural output value of the areas along the river accounts for about 40% of China's total economic output, and 40% of China's 1.4 billion people live in the Yangtze River basin.

Against China's complex political, social, and cultural context, the government is more concerned with livelihood issues while promoting economic development. However, the Yangtze River Basin faces multiple environmental challenges, including plastic pollution, water pollution, ecological degradation, biodiversity loss, overexploitation, and climate change. These challenges urgently require a multi-party response. Since the 1980s, various civil entities have flourished in China as civil society organisations have gained increasing global influence (Kahn et al., 2024, p. 8). Types of NGOs in China include international NGOs (INGOs), government-led NGOs (GONGOs) and bottom-up NGOs (NGOs). The development of ENGOs in China began in the mid-1990s and has since grown rapidly. Unlike in other parts of the world, Chinese NGOs promote their agendas by avoiding confrontational approaches and encouraging cooperation with the government (Kahn et al., 2024, p. 6). As times have changed, China's NGOs have gradually transformed from being peripheral participants to influential partners. One outstanding representative is the Green River, a grassroots Chinese ENGOs established in the 1990s, promotes and organises activities to protect the natural ecological environment in the upper reaches of rivers, promotes the development of civil society efforts to protect the natural ecological environment in China, raises environmental awareness and environmental ethics in society as a whole, and strives to achieve sustainable socio-economic development in the basin (Green River, n.d.).

ENGOs now have substantial impacts on people and their environments, both on the ground through project implementation (Brockington, 2002; West, 2006; Beymer-Farris & Bassett, 2012; Steenbergen & Visser, 2016; Watanabe, 2019; Partelow, Winkler, & Thaler, 2020) and through influence on policy from the local to international levels(Allan & Hadden, 2017; Keck & Sikkink, 1998; Larsen & Brockington, 2018; Partelow, Winkler, & Thaler, 2020; Princen & Finger, 1994; Thaler, Viana, & Toni, 2019). Throughout ENGOs worldwide, a few organisations have relied on their national resources to implement differentiated environmental protection actions by establishing conservation stations. However, some INGOs have taken a different path. For example, Greenpeace has established branches worldwide to promote local environmental initiatives. At the same time, among the first scientific explorers to complete the entire journey of the world's major rivers, only a few have continued this feat as a lifelong career in ecological and environmental protection. Some explorers were killed during their expeditions, such as Naomi Uemura, who completed the Amazon River in 1970. According to the available data, Yang Xin has been working on ecological and environmental protection for a long time.

Rivers have always been seen as metaphors for physical and symbolic boundaries. As dynamic entities, they break the static concept of traditional territorial boundaries and provide a wealth of symbolic meaning for culture, society and the environment. In the conservation practices of ENGOs, the image of the Yangtze River as a metaphorical boundary inspires unique emotions among people living along the river toward river conservation. Historically, the Yangtze River region relied on cruise ships and passenger terminals to connect the region. In today's practice of joint ecological protection of the Yangtze River, the Chinese government has put forward a development strategy along the Yangtze River centred on the 'Yangtze River Conservation' (Zheng et al., 2020), and through the enactment of the Yangtze River Conservation Law (Xinhua News Agency, 2021), the Yangtze River is being protected from the cultural metaphor of the Yangtze River as China's 'Mother River', calling for the active participation of various institutions and citizens in the cities along the river.

Brown et al. (2005) define ethical leadership as the "demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement, and decision-making" (p.120). Ethical leadership is not only reflected in individual behaviour but also in the actions of the entire organisation. The systemic design approach provides structured support for ethical leadership by focusing on multi-stakeholder, multi-level collaboration in complex systems such as environmental conservation, especially in cross-regional ENGOs. This paper explores how to promote sustainable development practices in ENGOs in the Yangtze River Basin by combining systemic design theory, an ethical leadership framework and the concept of 'metaphorical boundaries.

2. Methodology

This research adopts a mixed-methods approach that integrates the perspectives of systemic design, ethical leadership, and metaphorical boundaries. It aims to explore how the ethical leadership of ENGOs plays a key role in ecological and environmental conservation in the Chinese context, and how strategies in the Yangtze River Basin can inform the future development of a design-led, systemic roadmap. The research combines quantitative and qualitative methods to analyse data on Green Rivers' achievements and development milestones in environmental conservation. Semi-structured interviews and field observations are used to analyse the experiences and strategies of ENGO leaders in ecological conservation practices.

The semi-structured interviewees were selected from among the leadership representatives of Green Rivers, an environmental NGO. A consistent interview framework was used across all participants, covering topics such as their motivations for participating in ecological activities, the role of the Yangtze River in China's environmental conservation efforts, and the organisation's management structure and leadership style.

First, the research centres on the symbolic 'mother river' Yangtze, a metaphorical boundary in the Green River environmental conservation case study. This metaphor not only reflects the unique position of the Yangtze River in ecological and environmental conservation but also inspires the possibility of exploring new environmental governance and leadership models in regions with similar geographical and cultural backgrounds. Ethics, as a "tool for guiding personal behaviour, attitudes and manners" (Sharma et al., 2019, p. 714), is critical in the practice of ENGOs. As Naeem and Syed (2024) point out, "Ethical leaders' traits not only influence behaviours and decisions within the organisation but also play an important role in shaping the broader organisational context leading to the creation of an environment where ethical practices thrive and evolve" (Naeem & Syed, 2024, p. 1168). Based on this, this study aims to analyse how ENGO leaders in the Chinese context can use their ethical leadership to call on large-scale communities and volunteers to protect the Yangtze River ecosystem, thereby providing lessons for similar environmental governance.

Since grassroots ENGOs in the Chinese context inevitably need to address highly complex system issues when tackling ecological and environmental challenges, including the impacts of material, information, ecological, and economic flows, as well as the complex relationships among numerous direct, indirect, and potential stakeholders, this study focuses on the following two aspects. First, a qualitative study was conducted through semi-structured interviews with multiple ENGO leaders involved in conserving the Yangtze River's ecological environment. The interviewees received personalised questions based on a unified question framework before the interview, covering the Yangtze River's role in ecological and environmental conservation, motivation for participation, leadership style, organisational management and decision-making mechanisms, and the main challenges faced. Each interview lasted about an hour. The interview texts were coded using content analysis to identify and organise recurring concepts and key insights (As shown in Table 1). Secondly, the quantitative study collected and analysed data on the Green River Project's results and development milestones to quantitatively evaluate the results achieved by ENGOs in promoting ecological conservation practices, providing data support and verification for the qualitative study.

In addition, systemic design, as an important theoretical approach in this study, originated from the Politecnico di Torino in Italy at the beginning of the 21st century. Its core concept is to promote the sustainable development of the environment, society and economy through interdisciplinary methods and systems thinking. In the case of the Green River, a systemic design complexity map is used to analyse how various stakeholders collaborate and participate in environmental protection projects.

In the Yangtze River ecological conservation practice, ethical leadership is demonstrated by leaders and environmental NGOs who actively advocate ecological responsibility and promote public participation in conservation actions. Meanwhile, the systemic design provides a holistic understanding of the system, clarifying the various stakeholders and helping coordinate the multiple forces of government, business, and civil society organisations to work together within the complex ecosystem of the Yangtze River basin. At the same time, the metaphorical boundary of the Yangtze River as the 'Mother River' breaks down administrative and geographical constraints at the emotional and cultural

levels, fostering a sense of identity and belonging across boundaries and providing an effective platform for collective action. According to Lakoff and Johnson's (1980) theory of metaphor, metaphorical boundaries not only cognitively simplify complex information but also emotionally facilitate the mobilisation of collective action, thereby providing ethical leaders with a powerful tool for systemic design in real-life scenarios.

Finally, the study explores an effective model for multi-sector collaboration in ecological conservation involving government, businesses, NGOs and the public by mapping out a 'green river development path and stakeholder map' led by systemic design, providing theoretical and practical references for the policy framework and practical path for plateau ecological conservation, and apply holistic analyses of systemic design to support ethical leadership in environmental governance.

Table 1. Table of list of semi-structured interviews.

Name	Time involved (years)	Role	Affiliation
Yang Xin	32	Explorer, photographer, environmentalist	Founder/President of Green Rivers, Director of the Yangtze River Estuary Green Development Promotion Centre
Han Mei	24	Director physician at Golmud People's Hospital, classmate of environmental conservation defender Jiesang Suonandajie	Former Director of the Yangtze River Source Eco-Environmental Conservation Centre
Gejiaer Tudan Damba	14	Pastoralist of the Yangtze source	Director of the Yangtze River Source Eco-Environmental Conservation Centre, Yangtze River No. 1 Theme Postmaster
Shi Shile	5	British international accountant, account manager of the project finance department and credit department of the Shanghai branch of Société Générale, general manager of the internal control audit and risk management department of Huabao Xingye Fund Management Co., Ltd., general manager of Vanda Private Equity (Shanghai), partner of Shanghai Xinren Culture, Beijing Entrepreneur Environmental Conservation Foundation	Secretary general of the Yangtze River Estuary Green Development Promotion Centre
Zhong Peijian	3	China Changdian 606, 908 Captain (Yangtze River Route)	The postmaster of Changjiang 11 Theme Post Office

3. Results

After cross-analyzing quantitative and qualitative data, analyzing interview results, and using deductive methods combined with visualization tools to draw the Green River development milestones, full map of the Yangtze River basin and a map of the Green River conservation station and Green River development path and stakeholder map, and through comparative analysis of charts and graphs ten key ten comparisons between China's Green River, the results of 30 years of Green River conservation are displayed to evaluate the effectiveness of Green River in ecological and environmental conservation practices.

3.1. Results of the interviews

- Motivation to participate in eco-related activities

All interviewees described their initial motivation for getting involved in the Green River environmental conservation effort, and each shared unique and fascinating experiences. A recurring theme was the memory of specific historical events: four interviewees mentioned the 1986 Yangtze River rafting expedition that caused a national sensation, and three mentioned the tragic death of Jiesang Suonandajie, deputy secretary of the Zhiduo County Committee in Yushu, Qinghai Province, in January 1994, when 18 Tibetan antelope poachers shot him in the uninhabited area of Kekexili at minus 40 degrees Celsius. In addition, three interviewees recounted their experiences witnessing environmental changes at the source of the Yangtze River, and three said that Yang Xin's influence prompted them to participate in the Green Rivers project.

For example, interviewee Yang is an explorer, photographer and staunch environmentalist. Not only did he complete a rafting expedition down the entire Yangtze River in 1986, but he also made five expeditions to the source of the Yangtze, where he documented, through his camera, the profound impact of climate change and glacial retreat on the ecology and the lives of local people. Interviewee Han recalled:

> “After my classmate died, I began to feel strongly about the severity of environmental conservation issues in the highlands, and a sense of responsibility welled up inside me. It was not until Yang established the Suonandajie Nature conservation station that I started to pay attention to ecological environmental conservation.”

Another interviewee, Ge recounted:

> “In 1986, when I was in primary school, the school organised a celebration for the heroes of the Yangtze River rafting team, with all the teachers and students beating drums and gongs. It was not until 2011, when Green River set up a conservation station in Tangula Town, where I was born and grew up, and needed to recruit local managers, that I had the opportunity to get involved directly.”

In addition, interviewee Shi described the experience of conducting due diligence to identify an unqualified investment donation target and confirm Green River as the donation target while serving as the organisation's head.

- The role played by the Yangtze River in China's ecological and environmental conservation work

All five interviewees mentioned the close connection between their upbringing and the Yangtze River. Two came from the Source of the Yangtze, one from the Upper Yangtze and two from the Lower Yangtze. Han, who grew up at the Source of the Yangtze, recalled:

> "I noticed that the snow-capped mountains and the river changed significantly yearly during my upbringing. If the snow-capped mountains melt, it will seriously impact human health and the survival of all life, including wildlife and plants. The most direct consequences will be water shortages and the spread of various infectious diseases."

Another resident of Ge, which is located on the banks of the Ulan Moron, said: "The source of the Yangtze is not only where I grew up, but it also nurtured me. I have a deep affection for my mother river, and I can observe the changes in the Yangtze and its source grasslands and ecosystems." Yang, who comes from the Upper Yangtze, said with emotion: "With the Yangtze as your backdrop, you have to be strong; in the process of exploring and protecting the Yangtze, there have been many victims." Captain Zhong, who has been navigating the Yangtze said: "I have worked on the Yangtze for 40 years, and the Yangtze has accompanied me for half a century." In addition, interviewee Shi, starting from the point that "the Yangtze carries a rich historical and cultural heritage," explained the important role of the Yangtze in multiple dimensions such as geography, economy, culture and the environment.

- Management structure and leadership style

In terms of management structure and leadership style, all four interviewees emphasised Yang's unique personal charm, leading by example, perseverance and a strong sense of social responsibility. These qualities are key factors that attract other managers to continue to participate in the Green River Project. Green River has two centres, the Yangtze River Source Eco-Environmental Conservation Centre and the Yangtze River Estuary Green Development Promotion Centre. There are 15 conservation stations across most of China, as shown in Figure 2. Han, Ge, Shi and Zhong mentioned in the interviews:

> "Yang has been a committed leader in ecological and environmental protection for 30 years, particularly at the high-altitude Source of the Yangtze River. With his firm belief in environmental protection, charisma, credibility and heroic spirit, he has inspired volunteers, pastoralists, businesses, NGOs and governments from all over China to work together for the environment. He is rigorous and pragmatic, ensuring projects get off the ground, promoting cost-effective operations for NGOs, and demonstrating an entrepreneurial spirit to enhance sustainability. His moral leadership influences his team and inspires more people to devote themselves to environmental protection and promote the organisation's development through collaboration and a shared vision."

The key to Green River's success in ecological conservation in China and in rallying nearly 3,000 volunteers to carry it out lies in the organisation's credibility, product-driven approach, and transparent and fair project implementation. It is precisely through practical actions in exchange for public recognition that Green River has always adhered to the principles of fairness and transparency in project implementation and has used the power of example to rally people from all walks of life to work together towards a common goal.

3.2. Results of the analysis of complex mapping tools in systemic design

As shown in Figure 1, the distance between the protected stations along the Green River exceeds 6,397 kilometres. The operation of these stations requires cross-regional and cross-departmental collaboration. The similarity among these stations is that they are all located near rivers, reflecting the Green River's holistic strategy for protecting the river basin ecosystem. When recalling their most difficult decisions, each interviewee mentioned how these choices have further strengthened their commitment to environmental sustainability. For example, when faced with development difficulties, Yang Xin still firmly refused to accept donations from tobacco and fur companies that ran counter to environmental conservation concepts.

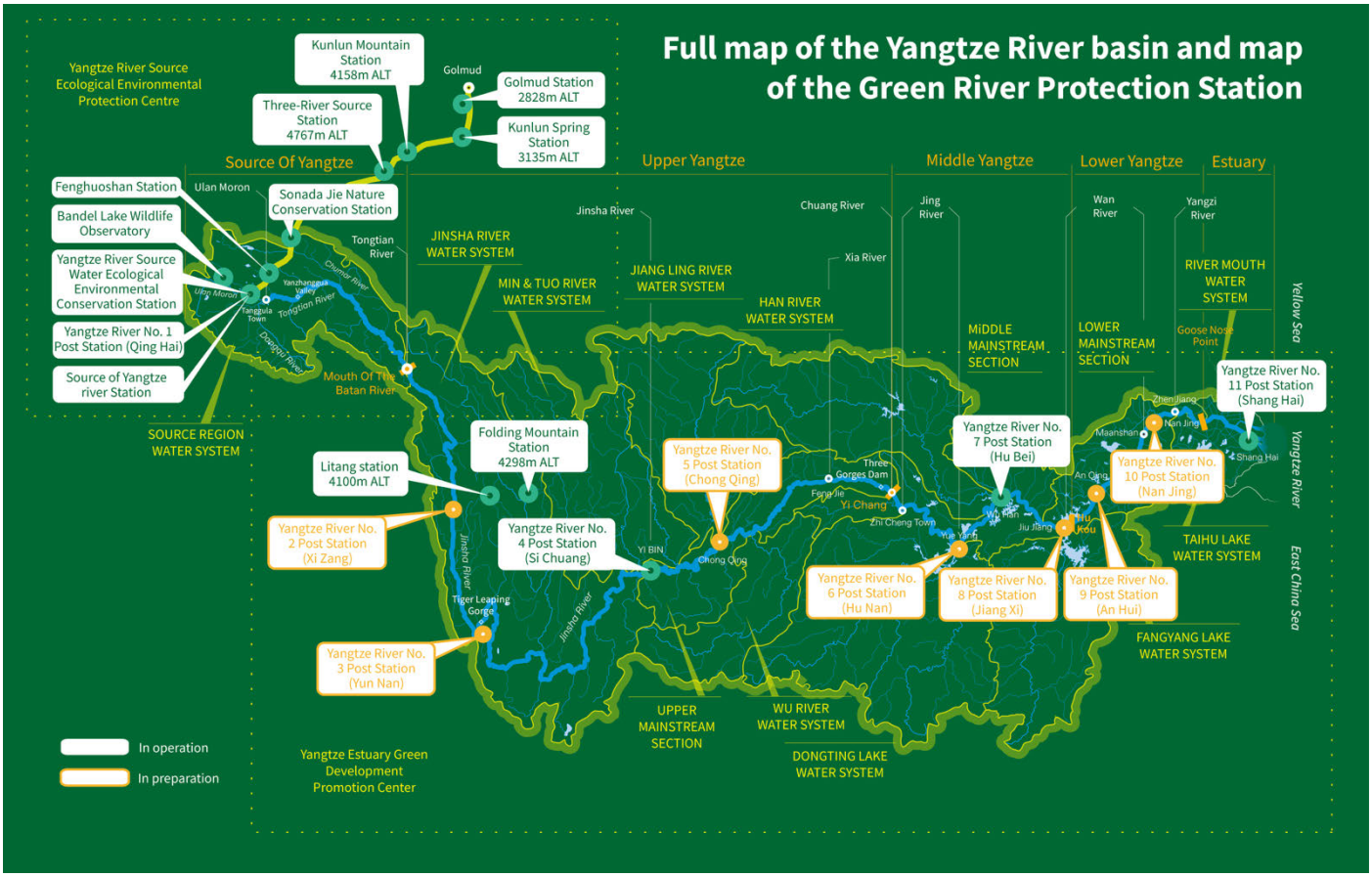

Figure 1. Full map of the Yangtze River basin and map of the Green River Conservation Station.

Figures 2 and 3 show that most conservation stations are in the Source region of the Yangtze. Their ecological conservation work mainly focuses on climate change and glacier retreat in the Source of the Yangtze, biodiversity and wildlife conservation, and packaging waste on the Qinghai-Tibet Plateau. From a systemic design perspective, ecological conservation does not focus on a single stakeholder but also requires a holistic understanding of all living things in the ecological conservation system and all material, energy, information, ecological, and economic flows that exist in direct, indirect and potential relationships with them, to achieve a comprehensive understanding and optimisation of the complex plateau ecological environment system. This comprehensive perspective ensures the project's long-term sustainability across environmental, social, and economic domains. Green Rivers follows a volunteer operation model of 'local government leadership, civil society mobilisation and participation, and social enterprise

supplement'. As shown in Figure 3, ecological and environmental conservation is not an isolated action but constitutes a complex ecological network in which every animal, every wetland, and participant plays an indispensable role. This approach transcends the limitations of traditional solutions and offers a new perspective and practical path for ENGOs to tackle complex ecosystem issues.

Figure 2. Green River development milestones.

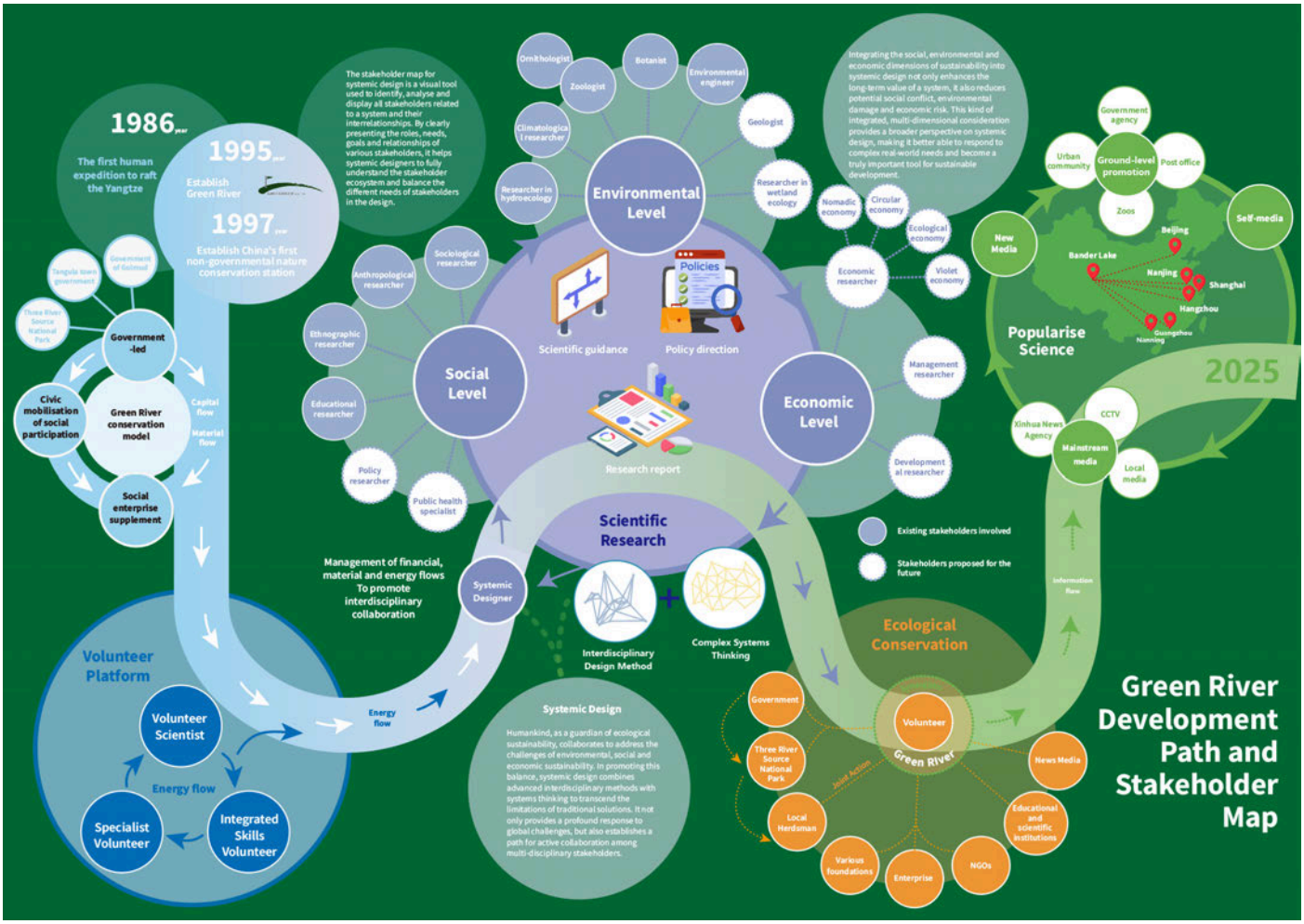

Figure 3. Green River Development Path and Stakeholder Map.

Table 2. Results of 30 years of Green River conservation.

Duration(years)	Project content	Results
2002 -2024	Recycling of waste on the plateau	1.65 million waste items (Green River, n.d.)
2005 -2010	Yangtze River Source Glacier Change Monitoring Project	Released 'Yangtze River Glacier Retreats 4,000 Metres in 40 Years' at the side event of the 2010 Climate Conference and became an observer organisation at the World Climate Conference (Xinhua News Agency, 2010; Yang, 2025, p92),
2012 -2024	Tourists participate in the 'Take a bag of trash away' project	About 60 000 people (Green River, n.d.; *Yang, 2025*)
2012 -2024	Anser indicus conservation project at the Bander Lake Wildlife Observatory	The maximum number of Anser indicus observed in a single day has increased from 1,172 in 2012 to 7,742 in 2023, showing a 6.6-fold growth trend (Lu., 2025, p. 102;)
2012 -2024	Biodiversity population survey of Lake Bande	Using a combination of volunteer and herder patrols, as well as methods such as drone surveys and camera monitoring, a total of 68 species of wild birds and animals were discovered in the 4.66 square kilometre Lake Bende wetland, including 47 species of wild birds and 21 species of wild animals (Chen, 2021). There are also 9 species of special plateau plants and 2 species of plateau fish populations (Xiong et al., 2022)
03/2024 -01/2025	Research action on tidal garbage along the coastline of two 50-metre sample areas in the Yangtze Estuary, Shanghai	The total weight of the waste is 591.5 kg, and the total weight of the plastic is 194.9 kg. This project involved 14 activities, with a total of more than 360 participants and 35 government units, enterprises, and organisations (Green River, n.d.)

4. Discussion and Conclusion

Green River's conservation stations operate with a combination of permanent staff and monthly volunteers. Recruiting high-quality management, fundraising, and project implementation talent is challenging in a low-cost operating model. However, Green River's nearly 30-year-old volunteer platform has created a situation where diverse resources complement each other: 'Some provide resources, some provide funding, and some provide technology or knowledge to work together to solve problems.' Much information shows that Yang Xin has won almost all the major environmental awards over the past 30 years and has had a decisive influence on the environmental movement in China. He has also 'used his network and adopted various strategies to initiate environmental campaigns' (Kahn et al., 2024, p. 7). "Green Rivers has used its charismatic founder and aligned itself with broader environmental values and messages in Chinese society to inspire broad and committed support for its goals" (Kahn et al., 2024, p. 5). "Despite regulatory and financial challenges, Green Rivers has been able to leverage its limited resources to significantly contribute to protecting the environment and rich biodiversity of the Yangtze River Basin" (Kahn et al., 2024, p. 2).

Green Rivers has built a sustainable ecological protection model in the Yangtze River Basin through cross-regional collaboration, systemic design methods, and ethical leadership. It has achieved remarkable results in plateau waste recycling, biodiversity monitoring, environmental education and public participation, providing innovative practices and important references for developing ENGOs in China and the ecological governance of the Yangtze River Basin.

The path of protecting the Green River fully reflects the unique geographical environment of the Qinghai-Tibet Plateau, as well as the innovative, sustainable and replicable nature of the conservation work carried out by scientists and local herders. This model provides a forward-looking management framework for ecological conservation in other areas of the Sanjiangyuan region and serves as an inclusive optimisation model by constructing a system that meets the basic needs of multiple species. This model can expand the scale of biodiversity resources and public welfare pools, promote broader social participation and commitment, and promote common development among all parties with a 'win-win-win' logic. The transparency of the method has led to open dialogue, a model of participatory governance that has become a successful case that can be replicated and promoted in ecological conservation. The collaborative cooperation model involving the government, NGOs, social enterprises, and the public has enhanced the efficiency and depth of ecological conservation and provided valuable experience for future ecological conservation practices in China and around the world.

One thing to note in terms of research transferability is that the Chinese government conducts a certain degree of regulation and review procedures for EGNOs' registration, approval of activities, fundraising, and international cooperation, which requires EGNOs to pay attention to changes in government policies to adjust their strategies and operational models to ensure compliance. This institutional context may limit the direct transferability of the research findings across different political and governance environments. The portability of future research also requires attention to local government policy orientations to clarify further the model's applicability in other countries or regions.

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EXPLORING SYSTEMIC DESIGN FOR POST-DISASTER RECOVERY: A CASE STUDY IN TURKIYE.

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ABSTRACT | The Systemic Design is an effective approach in complex social situations but has rarely been applied in post-disaster contexts. This study, conducted as part of an ongoing doctoral thesis in the Department of Industrial Design at Istanbul Technical University, aims to support the post-disaster recovery process by utilizing the Systemic Design approach in a region affected by the February 6, 2023 earthquakes in Türkiye. The research focuses on the local producers with traditional knowledge, who are key actors in the regional economy and cultural heritage. With this motivation, existing toolkits and studies in the Systemic Design field that can aid post-disaster context were examined and strategically framed to experience the approach in the region. Through the case, proposals and strategies for local producers were formulated based on data obtained from field research, observations, surveys, and interviews with local producers and all relevant stakeholders. Expert interviews and surveys will be conducted with designers, sociologists, and strategists using Delphi Method to understand the impact and contribution of the proposals and the Systemic Design approach. Throughout the study, it has been observed that the methods and tools from the Systemic Design literature have been valuable in analyzing the region's challenging conditions, making informed decisions, and managing complexity. The findings confirm that, as demonstrated in the literature for various social contexts, the Systemic Design approach is also a highly effective tool in post-disaster recovery. Sharing and highlighting the potential role of the approach in the post-disaster recovery process can serve as a starting point for practitioners conducting research in similar complex situations and indicate the different leadership alternatives of designers.

KEYWORDS | SYSTEMIC DESIGN, POST-DISASTER RECOVERY, DESIGN EXPERTISE, SOCIAL WELL-BEING, LOCAL PRODUCTION

1. Introduction

In recent years, the increase in global crises and the growing pressure on social systems have create interest in combining systems thinking and design practices to leverage their strengths. While systems thinking offers strong analytical capabilities, design brings action-oriented solutions (Buchanan, 2019). As the roles and responsibilities of designers evolve and the complexity of problems continues to increase, understanding and applying the principles, methods, and theories of the Systemic Design approach is becoming increasingly valuable in the field of design (Jones, 2014b; Peng et al., 2022). Systemic Design, an interdisciplinary field that combines systems thinking and human-centered design, offers a holistic approach to complex, multi-stakeholder situations. This approach has been applied in various contexts, such as industrial networks, transportation, medicine, and healthcare, integrating systemic approaches to enrich design methodologies and practices (Jones, 2014a). By utilizing Systemic Design principles such as idealization, appreciating complexity, purpose finding, boundary framing, requisite variety, feedback coordination, system ordering, generative emergence, continuous adaptation, and self-organizing, as outlined by Jones and Kijima (2018), Systemic Design aims to propose connected solutions that are sensitive to the dynamic nature of the systems they address. Despite its wide range of applications, there is a notable gap in the literature regarding the use of systemic design in post-disaster recovery and development processes. Previous research and Systemic Design applications have generally focused on public and social innovation, education, architecture, and healthcare. However, the potential of Systemic Design to contribute to disaster recovery, particularly in empowering communities in earthquake-affected areas, has not been sufficiently explored.

This study aims to explore how the Systemic Design approach can serve as an effective tool in the post-earthquake recovery process. Based on the Systemic Design framework provided by the Design Council (2021) and the practical tools presented in the Systemic Design Toolkit by Jones and Ael (2022), this study explores the problems, needs, and current conditions of local producers in the earthquake-affected region. By applying Systemic Design tools, the research aims to reach innovative and sustainable solutions that will facilitate recovery and enhance resilience in these communities and to experience the contributions that systemic design can offer.

2. Background and Motivation

The earthquakes that occurred in Türkiye on February 6, 2023, negatively affected the social and economic structure and had negative impact on local communities, relatively the livelihoods of local producers. The urgent need for sustainable development strategies after such disasters reveals the necessity of searching for guiding approaches. This study aims to examine and demonstrate how the Systemic Design approach can be applied in this context and how it can offer strategic solutions to the problems faced by local producers. Systemic Design is an approach that has the potential to provide integrated and sustainable solutions to complex and multidimensional problems. Although there are various studies in the literature on the use of Systemic Design in social issues, there is a limited number of studies on how this approach can be applied in post-disaster development processes. By focusing on local producers in earthquake-affected areas, it promotes a Systemic Design approach to develop strategic recommendations that not only support recovery and long-term resilience but also serve as a sample for similar post-disaster contexts.

The study, began with the aim of developing traditional knowledge in Hatay, a region rich in local, sustainable, and traditional products that were previously underrecognized and at risk of disappearing. Using a social innovation approach, specifically Ezio Manzini's SLOC (Small, Local, Open, Connected) model, the research focused on identifying unique regional products that needed promotion. System proposals were developed based on interviews with local producers and shared at scientific conferences to support their sustainability and visibility. However, with the earthquake of February 6, 2023, it has unfortunately become impossible or very difficult for local producers who survived the disaster to make their production to sustain their lives. In addition, the danger of the traditional knowledge of local producers disappearing has emerged as another important issue. According to the Presidency of Strategy and Budget of Türkiye (2023), the disaster threatens progress on Sustainable Development Goals (SDGs), including poverty reduction, food security, gender equality, education, and healthcare, highlighting the need for collaboration among public institutions, NGOs, universities, and the private sector to reduce its impact. As a result, the study placed greater importance on preserving traditional knowledge and aimed to better understand the challenges, disruptions, and needs of local producers in the post-disaster period.

In search of an alternative guiding approach, the literature was examined for methods, approaches, and strategies that facilitate inclusive, systematic, and rapid action on social issues. The findings indicate that the Systemic Design approach, which has been present in the literature since the 2010s and integrates systems thinking with design methods, was considered to play a significant role in post-earthquake recovery and sustainable development processes.

3. Systemic Design Approach

Systemic Design has emerged as an approach that encompasses economic, environmental, and social conditions, offering systemic and interconnected solutions to the complexity of the current situation (Battistoni et al., 2019). In the article "Design Research Methods for Systemic Design: Perspectives from Design Education and Practice," Jones, a pioneer researcher in the field, emphasizes that the integration of systemic approaches has become inevitable to enrich design methodologies and practices (2014a). According to Jones and Kijima (2018), Systemic Design creates an integrative interdisciplinary field by bringing technical knowledge, aesthetic skills, and creative practice to collective actions. In another article on the principles of Systemic Design, "Systemic Design Principles for Complex Social Systems," Jones (2014b) argues that Systemic Design combines systems thinking and methods with human-centered design to address complex, multi-stakeholder situations such as those found in industrial networks, transportation, medicine, and healthcare services. He suggests using a combination of known design capabilities such as idea development, designing, process management, research methods, and visualization to identify and restructure complex services and systems through a systems thinking approach. He states that Systemic Design is not a design discipline but an approach, and its ultimate goal as a strong design practice is to co-design better policies, programs, and service systems with the involved stakeholders. The Systemic Design approach integrates skills and domain knowledge at the levels of social organization and enables the identification of outputs such as new products or services that adapt to the ecosystem and the addressed situation. To achieve this, Jones (2014a) has defined principles for the Systemic Design approach, arguing that these principles provide guidelines and a foundation for practitioners to increase participation and develop better practices. These principles are defined as follows:

- Idealization
- Appreciating complexity
- Purpose finding
- Boundary framing
- Requisite variety
- Feedback coordination
- System ordering
- Generative emergence
- Continuous adaptation
- Self-organizing.

As a different framework, Ryan (2014) addresses Systemic Design through the following stages:

- Inquiring
- Framing
- Formulation
- Generating
- Facilitation
- Reflecting.

Ryan (2014) emphasizes that these approaches are useful tools to encourage participants when design projects involve stakeholders unfamiliar with the principles of systems thinking or design, and also important for the trial and sharing of best practices among Systemic Design practitioners. The Design Council (2021) defines a contemporary Systemic Design approach to bridge technological research, innovation goals, and social applications, creating a framework that raises awareness and enables designers from various disciplines to collaborate with other professionals and communities. The council defines the approach phases, as shown in Figure 1, based on their existing Double Diamond model, by acknowledging the complex nature of the challenges addressed and prioritizing both the planet and people. These phases are framed as Explore, Reframe, Create, and Catalyse. They emphasize that this approach considers not only the individual elements involved in a project but also how these elements are interconnected, how the system changes/can change over time, and how it relates to the broader environment.

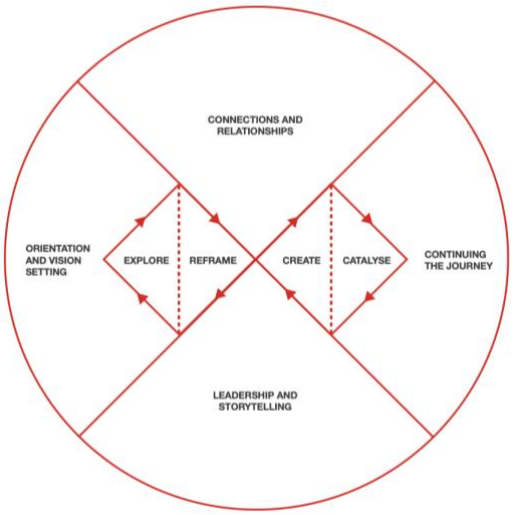

Figure 1. Systemic Design framework, Design Council (2021)

According to the council, researchers or practitioners who want to follow these phases should also adopt six fundamental principles. These principles are defined as being human and planet-focused, converging or diverging according to the current state of the process, testing and idea development, embracing inclusivity and diversity, establishing collaboration and creating connections, and being cyclical and regenerative.
In addition to the three different process approaches discussed above, Jones and Ael (2022) have created the "Systemic Design Toolkit" to guide designers and academics who want to apply the Systemic Design approach in understanding systemic problems and developing suggestions in their processes. This toolkit includes method templates for each phase under the main stages of Framing the System, Listening to the System, Understanding the System, Envisioning Desired Futures, Exploring the Possibility Space, Planning the Change Process, and Fostering the Transition, to be selected and used according to the situation.

3.1 Potential Contributions of the Systemic Design Approach

The increasing global crises and the growing pressure on social systems in recent years have rekindled interest in integrating systems thinking and design practices to build on the analytical strengths of systems thinking and the action-oriented strengths of design (Buchanan, 2019). Therefore, as the roles and responsibilities of designers change and the complexity of problems continues to increase, understanding and applying the principles, methods, and theory of Systemic Design is becoming increasingly valuable in design (Jones, 2014b; Peng et al., 2022). According to Ryan (2014), the Systemic Design approach allows for evaluating situations from multiple perspectives, collaborating with stakeholders to understand and shape the context, and developing deep empathy with them. Systemic Design helps groups quickly translate new insights into actions, provide alternatives to existing paradigms, and organize solutions to improve complex situations. Bijl-Brouwer and Malcolm (2020), who researched to understand how expert practitioners carry out Systemic Design studies in the context of public and social innovation, emphasize that designers have a rich set of methods and tools they can utilize, such as qualitative design research methods, collaborative and participatory design methods, and scenario creation. They highlight that designers can contribute to system change by framing problems to develop a systemic perspective, iteratively co-developing problems and solutions to address complexity, and shifting from individual user needs to a human-centered approach that explores relationships and designs new interventions (Bijl-Brouwer and Malcolm, 2020). This approach helps to manage resources, improve production processes through continuous transformation, and foster new relationships among individuals, leading to overall well-being (Bistagnino, 2011). Today's societal challenges require holistic approaches that can interpret and deliver innovative and sustainable solutions. Approaches like Systemic Design provide specialized tools to design new relationships among the units of a system, uncover their hidden relationships and potentials, and facilitate proactive collaboration among actors (Battistoni et al., 2019). Therefore, the Systemic Design approach requires the continuous and mutual learning process of all involved actors and a constant need for education through learning communities involving academics or practitioners from various disciplines (Bijl-Brouwer and Malcolm, 2020). In addition to these findings, a review of the Systemic Design literature shows that, while it has been applied in various fields like education, architecture, and health, its use in post-disaster recovery remains limited. The literature clearly demonstrates that Systemic Design, with its ability to foster innovation, adaptability, and collaboration, can be a powerful tool for addressing such complex social situations.

4. Experiencing The Approach as a Tool in The Post-Disaster Process

This research adopts the Design Council's Systemic Design Framework as its primary approach, based on various Systemic Design processes and approaches discussed in the literature. For the key stages defined by the council, appropriate methods from Jones and Ael's toolkit were selected to guide the necessary sub-activities.

In the explore phase, it is aimed to analyze the current situation or circumstances in line with the methods selected from the Systemic Design Toolkit. Based on interviews with 56 producers in Hatay, field research, and desktop research using Systemic Design methods; it has been seen that the need in the region is not only the difficulties experienced in the production phase (raw material supply, production area, or equipment supply, etc.) but also the uncertainty about which products should be produced, difficulties in finding sales channels and selling products, need for analyzing the market/customer needs or the reasons to not buying products from the region, lack of a sustainable and standardized operation and lack of a sustainable revenue model have emerged as major problems. In this context, from a designer's perspective, the most important need has been identified as understanding consumer preferences that enable sales. To address this, consumer preferences were researched and integrated into the system, based on a survey conducted with 301 participants across 11 countries.

The main purpose of the Reframe and Create stage is to create many different actions and ideas that will move the system towards a larger goal, by reframing the problem and getting rid of our current way of thinking, in the light of the data and observations obtained in the first stage (Design Council, 2021). So, according to identified problems, situations, and requirements, in the Reframe and Create phase the following details emerged and were framed as important findings for local producers who continue to produce and sell in the region:

- Need for creating the value proposition in the clearest way possible under current conditions.
- Need for a realistic, comprehensive, and detailed time plan and business model.
- Need for considering the possible risks that may arise specific to the project, taking precautions from the beginning of the process, and creating an alternative plan.
- Need for correct planning of sponsors/capital/financial resources and integration into the process at the right stage.
- Need for analyzing the end users' needs and feeding into the process continuously.
- Demonstrating to people outside the region that the rate of purchasing products from the region is quite low, and therefore the need for development and recovery in the region continues.
- Prioritizing online platforms to reach the consumer group to increase sales potential.
- The promotion of region-specific products on these platforms should be presented comprehensively, including the contents of the products, all their features, and production conditions.
- Clean content, health, hygiene, and safety criteria must be met in the products to be produced, and these criteria must be documented by the relevant institutions and displayed transparently (especially for food products, proving the use of raw

materials that are not affected by asbestos)
- Providing the entire product purchasing experience through an online platform where it will be safe will increase recognition and the possibility of selling products for manufacturers in the short term, and will provide easy access to products for consumers.

It is seen that the details are important issues and producers should consider them and continue their production, if production is made in this direction, the development processes will accelerate and be sustainable. The main aim of the Catalyse phase is to accelerate change by showing what a new vision looks and feels like and to reflect and share knowledge with the wider system (Design Council, 2021). So, sharing the findings with the producers and relevant actors in the region and ensuring that the producers produce in line with these recommendations will be a trigger for change. In line with this purpose, all findings and suggestions for change have been shared with such as local municipalities, cooperatives, non-governmental organizations, and potential consumers that the researchers can reach, and most importantly with the producers interviewed during the Explore phase, and will continue to be shared to increase the impact.

5. Discussion And Conclusion

This study aimed to explore the potential of the Systemic Design approach in understanding the needs and challenges of local producers in earthquake-affected regions and developing strategic solutions. It also tried to highlight a gap in the literature, as this approach has not been widely applied to post-disaster recovery. Systemic Design offers a novel and holistic methodology for addressing these complex challenges. In such a difficult post-disaster context with multiple sub-problems, its structured framework and methodological tools have played a crucial role in guiding and sustaining the process. Applying the Systemic Design approach in the context of the disaster-affected regions offered and can offers for similar context several potential contributions:

- Systemic Design approach allows for a holistic problem framing, comprehensive understanding of the interconnected issues for the focused area, enabling the development of more effective and sustainable solutions.
- The emphasis on understanding the needs and experiences of the people (local producers in this case) ensures that the proposed solutions are not only effective but also help to aligned with the community's values and aspirations. It can be said that it brings empathy and human-centered solutions to the complex process.
- Systemic Design promotes the exploration of innovative practices that can enhance the resilience of local production systems, contributing to economic recovery and long-term sustainability in this case. Based on this, it can be said that it can offer innovative solutions in similar situations.
- It improves the capacity to better respond to future challenges by developing strategic recommendations based on Systemic Design principles, increasing overall resilience so that the approach actually creates a foundation for similar situations in the future.
- For the realization of proposals in the future, by involving different stakeholders, including local producers, community leaders, consumers and governmental actors, can encourage collaboration and ensure that different perspectives are taken into account in the development process.

In conclusion, the findings of this research demonstrate the potential of Systemic Design to contribute to the recovery and long-term resilience of earthquake-affected communities. Moreover, this approach can serve as a sample case for addressing similar challenges in other regions impacted by natural disasters, conflict, or other crises, supporting the dissemination of knowledge and best practices. The effectiveness of applying the Systemic Design approach in this context will first be evaluated through expert feedback. Based on these insights, future research should further explore its use in diverse settings. This study contributes to the Systemic Design literature by demonstrating its application in post-disaster recovery, a context that remains underexplored. The structured yet adaptable nature of the approach proved effective in managing complexity and uncertainty. Using Systemic Design in future research on similar social issues can support the development of context-specific solutions and foster knowledge-sharing, helping to advance the field and address complex social problems effectively.

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FOSTERING A DESIGN-DRIVEN MANAGEMENT CULTURE: INTANGIBLE INDUSTRIAL HERITAGE AS A DRIVER FOR AN ETHICAL BUSINESS LANDSCAPE

Alberto Bassi, Giulia Ciliberto, Maria Cristina Addis, Jacopo William De Denaro, Marco Scotti (Università Iuav di Venezia)

ABSTRACT | This paper presents the outcomes of an interdisciplinary collaboration aimed at formalizing a design-based framework for mapping the Italian North-Eastern entrepreneurial ecosystem, starting from the intangible body of knowledge expressed by local companies in their interactions with design culture. In particular, our contribution focuses on the ethical role that a design-driven management culture can play in establishing a smart, fair and sustainable economic growth, able to face the challenges represented by globalisation, social polarisation, climate warming, and increasingly critical and uncertain geopolitical scenarios.

While it is becoming increasingly clear that expanding knowledge management is crucial to enable a critical evaluation of companies' organisational base, our framework interprets design as a major carrier of encoded knowledge, in order to unveil an underlying intangible industrial heritage able to activate virtuous interactions. Aim of the proposed framework is to synthesize and systematize an exchange of knowledge oriented not to consumption for its own sake, but capable of addressing all phases of products' and services' life cycle management (idea, project, production, distribution, usage, disposal). Such a perspective appears particularly significant at the time when the whole system of Made in Italy needs to reinvent itself relocating beyond financial capitalism, bringing into play the relevance of intangible assets and capabilities in enhancing companies' economic and cultural value.

Supported by field surveying activities such as interviews and workshops, our investigation has led to compiling a glossary of design-based indicators, which serves as a foundation for measuring intangible industrial heritage within local corporate entities through both qualitative and quantitative methods. By quantifying the presence of design in relation to a company's intangible industrial heritage, our framework outlines an interpretive paradigm that stands as an alternative toward those of traditional financial accounting and reporting, offering a more holistic perspective on corporate value.

Collected data and information will converge into a digital platform functioning as a collaborative ecosystem, in order to enhance the accessibility of intangible industrial heritage, reflecting its evolving and dynamic nature, as well as its connections with design practices. Leveraging the principles of service design, we aim to foster a multi-layered narrative about intangible industrial heritage within the Italian North-Eastern entrepreneurial ecosystem, strengthening the relationships between economy, culture, and society, thereby contributing to a more ethical business landscape.
This research has been developed in the framework of iNEST – Interconnected North-East Innovation Ecosystem – project. iNEST is a network of Universities, Public Research Institutions, Territorial Institutions and Companies active in technology specialization areas which are coherent with territorial industrial & research missions, and promote and strengthen cooperation among Research, Economic players and Institutions. Main objectives of iNEST are to facilitate technology transfer and digital transformation of companies and related processes, taking care of economic and environmental sustainability and of social impacts. iNEST is founded by the European Union – NextGeneration.eu.

KEYWORDS | DESIGN CULTURE, ENTREPRENEURIAL ECOSYSTEMS, INTANGIBLE ASSETS, DESIGN-DRIVEN MANAGEMENT CULTURE, SUSTAINABLE GROWTH

1. Introduction

The project for which we present these preliminary results aims to reinvigorate research and experimentation toward new business models driven by emergent value systems – values that have taken firm root in collective consciousness and sensitivity – yet for which innovative offerings of material and immaterial products, systems, and services remain largely absent.
Sustainability serves as a paradigmatic example in this context. Although the concept is widely invoked and appears in numerous advertising and communicative slogans, a closer look at the Italian landscape – and particularly at the entrepreneurial fabric of the North-East, the focus of our research project – reveals that few companies and designers adequately explain how they are operationalizing a holistic, integrated system and process that must be reorganized in line with this new value horizon (Bassi 2017).
In general, it is challenging to discuss sustainability – and corporate ethics more broadly – without at least partially questioning, from a reformist perspective, the very foundations of capitalism and the market driven by the intensive and seemingly infinite consumption of goods, natural resources, and human beings.
A question that had long remained unresolved in these difficult years has resurfaced with renewed intensity: do we resume from where we left off (recognizing that the recurring and perpetual crises of this millennium are the “natural” consequence of the current system), or do we embark on a new path grounded in sustainability and a renewed commitment to human, social, and environmental care, along with corporate and design social responsibility?
Our project embraces the latter option through a research and dissemination approach aimed at identifying and mapping those enterprises capable not only of mediating between individual and collective interests, private profit and the common good, economy and culture, but also of integrating these dimensions synergistically – thereby enriching the local knowledge capital with strategies and virtuous practices that have yet to be captured by existing systems for measuring corporate intangible assets.
In this framework, design assumes a central and cross-cutting role relative to other

intangible corporate values (Bulegato & Dalla Mura 2014, Ramírez Martín & Portela Filgueiras 2022). Whereas a company's ethical stance is demonstrated by its responses to shifting national and international scenarios and contemporary challenges (ranging from globalization and the ongoing financial market crisis, to climate change, political uncertainty, and humanitarian crises exacerbated by conflicts increasingly near our territory and linked to Italy – as well as the economic and socio-cultural disruptions introduced by digital media, unemployment, and the precariousness of human resources), design is tasked with diagnosing the existing complexity and conceiving solutions that facilitate connection and mediation among all the stakeholders and interests involved.
Building on an examination of the interrelations between design and entrepreneurship, we intend to investigate the presence and impact of corporate intangible values – including, and especially, those excluded from WIPO (World Intellectual Property Organization) lists or assessed solely on the basis of a company's economic success – without accounting for the social and cultural functions performed by the related assets (such as research & development, communication, organizational structure, and relationships) within the myriad communities an enterprise engages, from suppliers to distributors, employees to consumers, and from local territories to global arenas.

2. Beyond the Concept of Capital: On Intangible Industrial Heritage

This research aims to formalise a design-based framework for mapping territorial entrepreneurial ecosystems starting from the intangible body of knowledge expressed by local companies in their interactions with design culture. The final objective of the project is to collect, disseminate and foster the reuse of knowledge, capabilities and good practices which are still largely unstudied and often unperceived.
Focusing on design and its connections with other crucial intangible assets (Bassi & Bulegato 2018, Bassi, Bonini Lessing & Bulegato 2018, Corà, Fazio & Collura, 2023), our study addresses the grey zone in-between industrial heritage and intangible capital, that is, between the study of our industrial past and the recognition of its contemporary forms (Volpe, 2018), as well as between theoretical studies and business strategies, between economy and culture, between politics and aesthetics (Bassi, Pantano, & Ranzo, 2023).
On the one hand, the recognition of industrial heritage has typically been focused on its more material sides such as products, machines, buildings, landscapes, and artefacts (Lores, 2008, Rojas Sola, 2022), while in contrast very little attention has been paid to knowledge, memories and identities that they embody and express. On the other hand, studies (mostly in the area of economics and marketing) on intangible capital tend to focus on values from which the company derives a direct economic benefit (Seyr & Hoffer, 2021, Calzada-Prado, 2022, Beliaeva, Bounfour & Nonnis, 2023), while design cultures and practices are rarely studied as such and in their broader connections with society and culture.
In fact, to date the most significant advances in the study of corporate intangible assets have been achieved within the economic and financial domains, where they define what is known as corporate intangible capital. Corporate intangible capital comprises the set of non-material resources that determine a company's value (Haskel & Westlake, 2018). It is not a fixed or static parameter, but rather depends on a wide range of factors characterizing individual production systems.
As specified by the International Financial Reporting Standards (2024), the main indicators of corporate intangible capital are:

- Relationships
- Proprietary technologies
- Industrial and intellectual property
- Codified knowledge
- Industrial and corporate trade secrets
- Rights
- Organizational architecture

According to the annual report of the Brand Finance Global Intangible Finance Tracker (GIFT), in 2023 the global corporate intangible value increased by 8%. The economies with the highest intensity of intangible assets are the United States, Ireland, Denmark, the United Kingdom, and France. The industrial sectors with the highest degree of intangible value include:

- ICT
- Banks and financial institutions
- The mining and automotive industries
- The pharmaceutical industry

While intangible assets have an increasingly significant impact on global financial markets, this trend appears to affect Italy and its manufacturing industry only marginally. In our view, this gap reveals that the national entrepreneurial fabric – and particularly that of the North-East (Roverato, 1996, Brunetti, 2015) – embodies intangible assets that escape the measurement systems developed within the economic and financial sectors. In other words, the local entrepreneurial culture expresses an added value that is difficult to fully capture using the current conception of intangible capital.
Indeed, our framework accounts for seemingly marginal and unsystematic aspects that are, in reality, crucial and determinant for a company's identity and success, such as:

- Design and project culture
- Visual identity, advertising, and communication
- Relationships with the territory and the community
- The density of the industrial ecosystems in which the company operates
- Membership in industrial districts
- The presence of, or initiatives related to, archives, museums, libraries, institutions, foundations, as well as exhibit and visual design practices

For this reason, it is necessary to move beyond the concept of intangible capital in favor of that of heritage (UNESCO, 2003). Corporate intangible heritage consists of valorizing the cultural potential of a company's intangible assets. An asset with cultural potential is one in which the "value for the company" (in terms of competitiveness, responsiveness to market and socio-cultural contexts, reputation, visibility, prestige, and sustainability) is inseparable from the value that the asset holds for the industrial ecosystem, various stakeholder clusters, the local community, the well-being of individuals and communities, the identity and memory of the territory, environmental impact, the history of material culture.
In fact, investments in design often include expenditures targeted to knowledge management (Norman, 2023), taking forms such as education and training, product research and development, communication and brand identity, quality of working and production spaces, provision of cultural activities and facilities (Cross, 2007). These kinds of assets and capabilities, which are increasingly shaping the distribution of income in global value chains, are crucial to develop a resilient and sustainable management

culture; however, they are generally difficult to measure and assess, involving a variety of features that are not recognizable in merely quantitative terms.
A greater understanding and awareness of the value and potential of design and project cultures – and of the other intangible assets we have identified, we contend – can provide companies with the opportunity to steer their economic actions also on ethical grounds. This entails finding solutions to contemporary challenges that most effectively connect and mediate between individual interests and the common good, thereby triggering virtuous cycles between a company's market value and the social and cultural value it creates for communities, for the territory, and for the history of material culture.
Given these premises, our research is geared toward identifying strategic design-based modes of business-making in the target area, through a cross-sectoral approach intercepting different fields, from design theory and history to territorial studies, economics, semiotics, and cultural heritage.
Our approach delves into the study of traditional intangible assets while introducing new ones, with the aim of appreciating and measuring their cultural and economic potential, deepening our understanding of those that are less studied or recognized, and disseminating knowledge, tools, and best practices for ethical leadership.

3. Mapping intangible industrial heritage

In order to map industrial intangible heritage in the North-East area, the research team carried out a range of activities accordingly to some closely related macro-areas:

- reconstruction of a critical debate starting from a multidisciplinary context;
- definition of a network of partners, companies, and scientific advisors;
-
- desk and field research activities aimed at improving the methodology for mapping the corporate intangible heritage expressed by the companies which operate in the North-East region;
- development of digital tools for mapping corporate intangible heritage and for making it accessible to stakeholders and the broad public;
- dissemination activities of the research results.

In order to define and quantify intangible assets, we adopted a multidisciplinary approach that enabled the development of a methodology based on ongoing debates within various disciplines. Reference bibliographies were created, with a focus on the history and criticism of design, which is part of the broader transformation that has been underway for decades in the humanities and social sciences.
Concomitantly, thanks to the mediation of the Iuav Foundation, we established an initial pilot group of companies to test the indicators for quantifying the intangible assets of a business: Arper (furniture), Lanificio Bottoli (textile), Campagnolo CMP (Tech Wear), Magis (furniture, lumen), Riso Melotti (food).
In light of studies on intangible capital, intangible industrial heritage, and the history and criticism of design, we developed a provisional list of assets to be measured (Figure 1):

- Design
- Research & Development
- Identity and Communication
- Cultural Heritage
- Territorial context
- Work organization

- Company spaces
- Welfare
- Relationships
- Education

The measurement tested during the first research phase proved to be extensive and horizontal, causing dispersion and, in some cases, ambiguous, irrelevant, or overly simplified data. Furthermore, the concept of industrial intangible heritage turned out to be unclear for some of the interviewees. From this preliminary data processing come the corrective actions described in the following paragraphs.

3.1. Enhancement of the indicators system aimed at quantifying the company's intangible assets

To address the issues mentioned in the previous paragraph, the following modifications were made:

1.4 Hierarchy of indicators, with a focus on design and project culture:

- Design
- Research & Development, Identity and Communication, Cultural Heritage
- Territorial context, Work organization, Company spaces, Welfare, Relationships, Education.

2.4 Introduction of meta-indicators to measure the impact of the asset on the company in more detail:

- Degree of presence of the asset (Table 1)
- Role played by the asset within the company (Table 2)
- Degree of connection of each asset with all others (Table 3)
- Degree of awareness of the company regarding the asset (Table 4)

Design is the most relevant asset, defining the intellectual and cultural infrastructures underlying the processes of conception, creation and iteration of new products or services. The assets *Research & Development, Identity and Communication, Cultural Heritage* are the most related to design. The *Research & Development* asset consists of the total value of knowledge, skills and experience that can give a company a competitive advantage. The asset *Identity and Communication* expresses the brand identity through different communication channels, according to a strategy consistent with the corporate philosophy. The asset *Cultural Heritage* encompasses the set of institutions, offices, initiatives and projects dedicated to the enhancement of the cultural heritage expressed by the company and/or the reference territory and community.

Figure 1. Representation of the proposed design-based framework

The assets at the third level define the domains that could mainly benefit from design-driven strategies aimed at implementing the ethical management approach. *Territorial context* comprises the set of environmental resources capable of providing goods or services that are crucial to sustaining a company's past, present or future prosperity and resilience. *Work organization* covers the working practices of managers, employees and co-workers within individual departments and divisions, recruitment and personnel management policies and work-life balance measures. *Company spaces* defines the design of work and production spaces and other areas reserved for employees in terms of healthiness, comfort, accessibility, aesthetics, sustainability. *Welfare* focuses on the conditions that determine the quality of employees' work, taking into account their specific needs, constraints, backgrounds, behaviours and desires. *Relationships* includes the set of relational structures that the company establishes towards its network of primary and secondary stakeholders, and the impact of these relationships on production. *Education* includes all training measures and programmes for employees, directly related to the tasks and work activities of the concerned human resources or relating to transversal skills (such as second or third language or updates on safety, legality or sustainability).

Table 1. Meta-indicator 1: presence of the asset

Value	Label	Description
0	absence	The asset is not present
2	implicit presence	The company expresses the asset but in an implicit form; activities or tasks such as design, communication, human resources management are carried out transversally by other departments or directly by the CEO.
4	explicit presence - collaborations on projects	The activities or tasks envisaged by the asset are carried out sporadically through collaborative projects with third parties such as cultural institutions, universities and research bodies, NGOs and the third sector, other companies
6	explicit presence - external collaborators	The activities or tasks covered by the asset are carried out by ad hoc personnel but external to the company, who acquire the service from third parties.
8	explicit presence - internalised	The company has a department or office dedicated to the asset.

Table 2. Meta-indicator 2: role of the asset

Value	Label	Description
0	capability	The company has a department and/or space and/or office and/or human resources dedicated to the asset, but this capital is not converted into specific activities or actions.
4	tool - brand identity	The asset has an active function in the construction of the company's image to the outside world and of the company brand.
6	tool - production and marketing	The asset has an active function in optimising the company's performance in the market.
8	tool - integrated functions	Consistency between the two main functions of external communication tool and internal design and innovation tool

Table 3. Meta-indicator 3: connections between assets[1]

Value	Connected asset(s)
n x 8	Design
n x 4	Research & Development, Identity & Communication, Cultural Heritage
n x 2	Territorial context, Work organization, Company work spaces, Welfare, Relationships, Education

[1] The *n* value n is determined by the sum of the value assigned to the presence of the asset and the value assigned to its role.

Table 4. Meta-indicator 4: awareness of the company

Value	Label	Description
0	absence	The company does not assign particular value to the asset
2	passive isolated awareness	Awareness expressed by one or more managers/departments, who recognise its potential but do not translate it into concrete actions to enhance, promote and implement the asset.
4	passive widespread awareness	Awareness integrated with the corporate vision and mission.
6	active sporadic awareness	Awareness expressed by one or more managers / departments that lead to actions to valorise, promote and implement the asset.
8	active widespread awareness	Awareness integrated to the company's strategies and economic action

3.2. Redesign of the interview format

Corrective actions also included a redesign of interview format. In order to build a trust-based relationship with the interviewee and facilitate the acquisition of relevant but implicit information, we designed a conceptual map representing the assets and a set of cards dedicated to each asset.
To begin the interview, the research team presents the map to the interviewee and asks them to choose the indicator they most identify with, while also showing them the corresponding card. As to avoid dispersing the interviewee's attention and to obtain more accurate data, we also created a semi-structured questionnaire that follows the hierarchy of the assets presented above.
We tested the new interview format on companies in the first pilot group, in order to gather the missing data and complete the partial ones. Although the new method proved effective, we encountered additional challenges:

- Lack of transparency regarding the objectives of the questionnaire
- Excessive amount of information requested
- Lack of immediacy in the content of the questions

The most motivated companies were involved in further exchanges via email and video-conference during October and November 2024, with the aim of increasing the knowledge of the company's intangible assets and assessing the effectiveness of the interview.

The main outcomes of these exchanges were:

- Refinement of the definition of intangible business assets, with a more precise distinction between intangible capital and intangible heritage;
- Expansion of the state of the art to include studies on both tangible and intangible industrial heritage;
- Simplification of the structure, content, and language of the questionnaire.

In line with the results of the testing actions, we integrated the map/cards system with the semi-structured questionnaire (mixed approach).

The most effective solution proved to be the mixed approach; exposure to the map and cards stimulates the acquisition of particularly relevant information for the company, allowing for the establishment of a trust-based rapport with the interviewee and facilitating the explicit expression of implicit knowledge and skills, which the company is often not fully aware of. The questionnaire, restructured in terms of transparency, simplicity, and focus on design and project cultures, helps optimize the acquisition of relevant information and the accuracy of the value assigned to each asset.

3.3. Creation of a second pilot group of companies on which testing the improved mapping methodology

In parallel with the development of the methodology for measuring intangible capital, we optimized the criteria for selecting the case studies:

- Thematic balance, aimed at ensuring representation of the main industrial sectors covered by the local manufacturing industry;
- Focus on company museums.

In light of the new criteria, we established a second pilot group of companies: Battistella Spa (furniture), De Longhi (food machineries), Formest (metal carpentry), Luxardo (food), Manifattura Valcismon (Tech Wear), Salco (packaging), Selle Royal (cycling).

Interviews with the second pilot group have been scheduled by January 2025 and will be completed by March 15, 2025.
The research team is planning a roundtable with all the companies involved in the project in order to share the research findings and collect feedback and suggestions. The event will take place no later than April 15, 2025.

3.4 Development of digital working tools to support the team in the mapping of intangible assets

The development of digital tools focuses on creating a comprehensive system-conscious approach that supports the research team in mapping intangible assets. These tools need to reflect the complex nature of company systems and their various actors, including employees, stakeholders, and the broader community.
The key features of these digital tools encompass data collection mechanisms that capture both quantitative and qualitative aspects of intangible assets, alongside analysis frameworks that consider the interconnected nature of primary indicators such as Design, Identity and Communication, Research & Development, and Cultural Heritage, as well as secondary indicators. The tools include sophisticated visualization capabilities that represent the relationships between different company actors and intangible assets, while offering seamless integration capabilities with existing company systems and databases. Furthermore, collaborative features enable multiple team members to work simultaneously on data collection and analysis.
These tools are designed to support a holistic view of the enterprise, encouraging system-conscious awareness of company complexity, recognition of relationships between different intangible assets, and understanding of how various actors interact within the company ecosystem.

3.5 Interactive questionnaire design and development

The interactive questionnaire represents a crucial component in data collection, designed to overcome the challenges identified during initial research phases. Based on feedback from companies, the questionnaire needs to balance comprehensive data collection with user-friendly implementation. The design incorporates adaptive questioning paths based on company size and sector, while integrating both structured and semi-structured interview elements to support spontaneous dialogue about intangible heritage.
The questionnaire system features a simplified interface to address complexity concerns raised by companies, complemented by built-in guidance and explanatory materials. From a technical perspective, it includes real-time data validation and verification, comprehensive progress tracking, and save functionality. The system supports multi-user access for different company stakeholders, provides automated preliminary analysis of responses, and seamlessly integrates with the main platform database.

3.6 Platform design and development

The platform development focuses on creating two distinct but interconnected areas: a public space for general mapping and a personal area for detailed company analysis. The public area provides surface-level mapping of participating companies in North-Eastern Italy, educational content about intangible heritage research, interactive visualization of regional business ecosystems, case studies, success stories, and detailed information about the research methodology and objectives.
The personal area offers detailed company-specific intangible asset visualization, continuous data collection tools and interfaces, custom reporting and analysis functions, collaborative spaces for internal company stakeholders, and tools for tracking changes in intangible assets over time.
The platform's design principles emphasize promoting cooperative competition ("coopetition") rather than pure competition, while supporting system-conscious and system-shifting objectives. It integrates all identified company actors including employees, management, stakeholders, and community members, with an emphasis on holistic business views beyond financial metrics and tools for measuring and promoting virtuous entrepreneurial practices.

3.7 Dissemination activities

First research findings have been disseminated by participation to national and international design conferences and articles on scientific international design and cultural heritage journals.

4. Conclusions

In order to stimulate virtuous entrepreneurship, we must first be capable of mapping and implementing the virtuous management practices already in place within the territory. In this regard, despite the growing need and demand for design – that is, a method of planning and action aimed at identifying solutions to novel problems and at examining and diagnosing existing conditions in their complexity and in relation to people, markets, society, and culture – design and project cultures are never systematically studied as such, either in isolation or in their broader connections with social and geopolitical transformations.
This observation served as the starting point for our work, the primary outcome of which is the development of an interactive platform for the dissemination of intangible heritage, aimed at stimulating an entrepreneurial ethic guided by design culture. The design of this platform adopts a “system conscious” approach: through a user-centered perspective, our method

conceives the enterprise as a complex organism – composed of clients, employees, management, suppliers, investors, local communities, and regulators – thereby helping it to comprehend its systemic dimension through the indicators of intangible heritage. This approach enables us to enhance the interconnections among the various actors and to underscore how every business decision reverberates throughout the entire ecosystem.
Moreover, the platform functions as a tool for "system shifting", stimulating entrepreneurial behaviors that focus on cultivating intangible heritage and are guided by design culture, thereby shifting the corporate perspective from mere profit towards a holistic vision grounded in intangible assets. This paradigm shift is fundamental to constructing a more sustainable and responsible form of entrepreneurship, one that is capable of generating not only economic value but also social and cultural benefits.

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Fostering Ethical Design Entrepreneurs in China: The Implications of the Design Leadership Competency Model

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ABSTRACT | As the design field evolves, design leadership is increasingly recognised as pivotal in guiding organisations toward innovation. High-profile companies led by designers in their founding teams, illustrate the growing impact of design leadership on business success. In China, design entrepreneurs are playing an increasingly critical role in driving industries forward. With rising societal expectations such as sustainability, inclusivity, and social responsibility, there is an increasing need to understand the competencies required for effective design leadership—particularly regarding the ethical aspects. Although many studies highlight the importance of ethics for designers and entrepreneurs, the ethical aspects of design leadership have received limited attention, let alone how it can be fostered in design education.

This paper introduces a design leadership competency model, developed with a particular focus on China, and presents its implications for ethical leadership. The model was developed with a qualitative methodology using a triangulation of three data sources: analysis of 50 job descriptions for senior design-related roles to identify required competencies; a review of 12 case studies from grey literature focused on design entrepreneurs; and semi-structured interviews with 26 design leaders who have transitioned into leadership roles. The resultant model consists of 16 core design leadership competencies such as creative problem-solving, design communication, and design sensitivity. The model was then validated through 14 interviews with educators, students and alumni in design management, as part of a case study of Shandong University of Art & Design, to assess the model's relevance and completeness. In addition to getting feedback on the model, participants were specifically asked about the ethical competencies within both design education and design entrepreneurship contexts. This

inquiry explored the link between ethical aspects and competencies in design-driven entrepreneurship as perceived by design management experts and students in China and their implications for Chinese design education, which plays a crucial role in shaping future leaders. While the study specifically focused on design management in China, the findings provide actionable insights for design education in different contexts, ensuring that future design leaders are equipped to address both creative and ethical challenges in their leadership roles.

KEYWORDS | Design Leadership, Ethical Leadership, Design Education, Design Entrepreneur, Design Management, China

1. Introduction

With the growing recognition of design as a critical factor in driving innovation and business success (Budd, 2016; Gloppen, 2009), real-world examples such as Pinterest and Airbnb illustrate the tangible impact of design leadership. Such companies extend the influence of design to the executive level, stimulating creativity and innovation (Gemser et al., 2023; Hsieh et al., 2021), and can contribute to business success (Eikhaug, 2019). In many successful companies, leaders with a design education background or those who began their careers as designers drive significant value. There is also an increase in design entrepreneurs in China, with many design-led businesses emerging (Huang, 2022; Tong, 2023; You, 2023). In parallel, societal challenges, such as environmental sustainability (Liu, 2023; Xi, 2019), rural revitalisation and inclusivity (Liu and Li, 2023), are increasingly targeted via various policies in China, influencing business strategies and design practices. However, research on design leadership and its impact on societal challenges remains limited. Specifically, it becomes important to understand the competencies of design leaders that embody and facilitate ethical design and business practices capably addressing these societal challenges.

This paper introduces the ethical dimensions embedded in a design leadership model developed through document analysis and interviews with design leaders and validated through semi-structured interviews with academic staff, students, and alumni of Design Management programmes at Shandong University of Art and Design. The study sheds light onto the design leadership competencies that foster ethical design practices, as well as their shortcomings in capably addressing the societal challenges of our time.

2. Ethical Leadership in Design

Design is inherently tied to social responsibility because designers create products and services that shape people's lives (Eggink et al., 2022). Design ethics often focuses on professional behaviour guided by moral duty, goals, and virtues (Anjou, 2010a), especially when designers and design leaders are faced with complex decisions, like balancing aesthetics, market demands, and societal needs (Anjou, 2010b). Design thinking emphasises collaborative, socially responsible approaches that prioritise innovation and ethics over pure profit (Hussain, 2013), suggesting that designers or individuals with a design-thinking mindset may have an inherent advantage in addressing ethical aspects.

There are various tools and models for ethical design practice. For example, tools like Value Sensitive Design and responsibility analysis help designers tackle ethical dilemmas (Lindberg et al., 2020). Anjou's (2011) five-phase model provides a practical framework for ethical decision-making in design, primarily focusing on design awareness and reflection while promoting thoughtful decision-making that integrates ethical awareness at every stage of the design process. As an important role at the strategic level in the company, design leaders hold a huge responsibility in creating ethical systems aligning design with the organisation's mission and long-term sustainability (Eisenbeiss, 2012; Epley and Tannenbaum, 2017), making fair decisions (Eisenbeiss, 2012), and fostering a culture of respect, diversity and ethical awareness throughout the organisation (Eisenbeiss, 2012), by utilising actively reflecting, debating, and challenging the status quo (Lindberg et al., 2020).

While design leadership and ethical leadership emerge from different scholarship on leadership, they share several overlaps. Both design leaders and ethical leaders have

similar competencies, particularly in areas such as vision, empathy, and collaboration.

1. *Vision and Strategic Thinking*: Design leaders envision desired futures, define strategic goals, and create pathways to achieve them (Turner & Topalian, 2002). Similarly, ethical leaders inspire trust by aligning their decisions with long-term benefits for society and their organisations, often challenging existing norms to promote progress (Eisenbeiss, 2012; Lindberg et al., 2020).
2. *Empathy:* Ethical leaders demonstrate empathy, imagination, and sensitivity, fostering environments where respect and collaboration thrive (Greenleaf, 1977; Brown & Trevino, 2005). Similarly, design leaders employ user-centred approaches, understanding the needs and experiences of diverse stakeholders to create meaningful and inclusive solutions (Hargadon, 2010).
3. *Collaboration*: Ethical leaders focus on building a sense of community and promoting fairness and inclusion in their teams (Northouse, 2007). Similarly, design leaders advocate for cross-disciplinary collaboration, aligning design expertise with organisational goals and stakeholder needs (Tan & Chapman, 2017).

This overlap between design and ethical leadership shows the potential for ethical design leadership practices and constitutes a starting point to explore the ethical dimensions more explicitly within design leadership models.

3. Methodology

The previous study developed a design leadership model consisting of 16 main competencies through the triangulation of three primary data sources: semi-structured interviews with 26 design leaders in China, 50 job descriptions for design leadership or related roles collected from job-seeker websites, and 12 case studies of design leaders sourced from grey literature. This diverse dataset provided real-world insights, particularly within the Chinese business context, offering a comprehensive perspective on the overall scope of design leadership. This paper presents the validation of this design leadership model through 14 semi-structured interviews of academic staff (n=3), students (n=8), and alumni currently working as design leaders (n=3) from design management programmes at Shandong University of Art and Design.

Shandong University of Art and Design (SDAD) was selected as a case study considering its relevance and historical significance to design management education. SDAD is among the first universities in China to establish a design management program in 2003. Its undergraduate and postgraduate design management programs focus on integrating design with entrepreneurship and leadership, aligning closely with this study's aim of fostering design-driven entrepreneurship and leadership competencies. The comprehensive curriculum at both levels allows for a broader understanding and valuable insights about the development of ethical competencies.

The interview questions were structured into two sections. The first section aimed to explore participants' perceptions of ethical aspects of the program, including the ethical responsibilities and abilities of design leaders, as well as their views on how ethics is reflected in the design leadership model. The second section sought general feedback on the design leadership model, specifically identifying missing competencies, highlighting important ones, and suggesting competencies that could be removed.

4. Findings

4.1 Key Ethical Competencies in the Design Leadership Model

While ethical aspects are embedded across all 16 competencies of the design leadership competency model (Figure 1), the interviews revealed the following as more prominent in significantly influencing a design leader's behaviour.

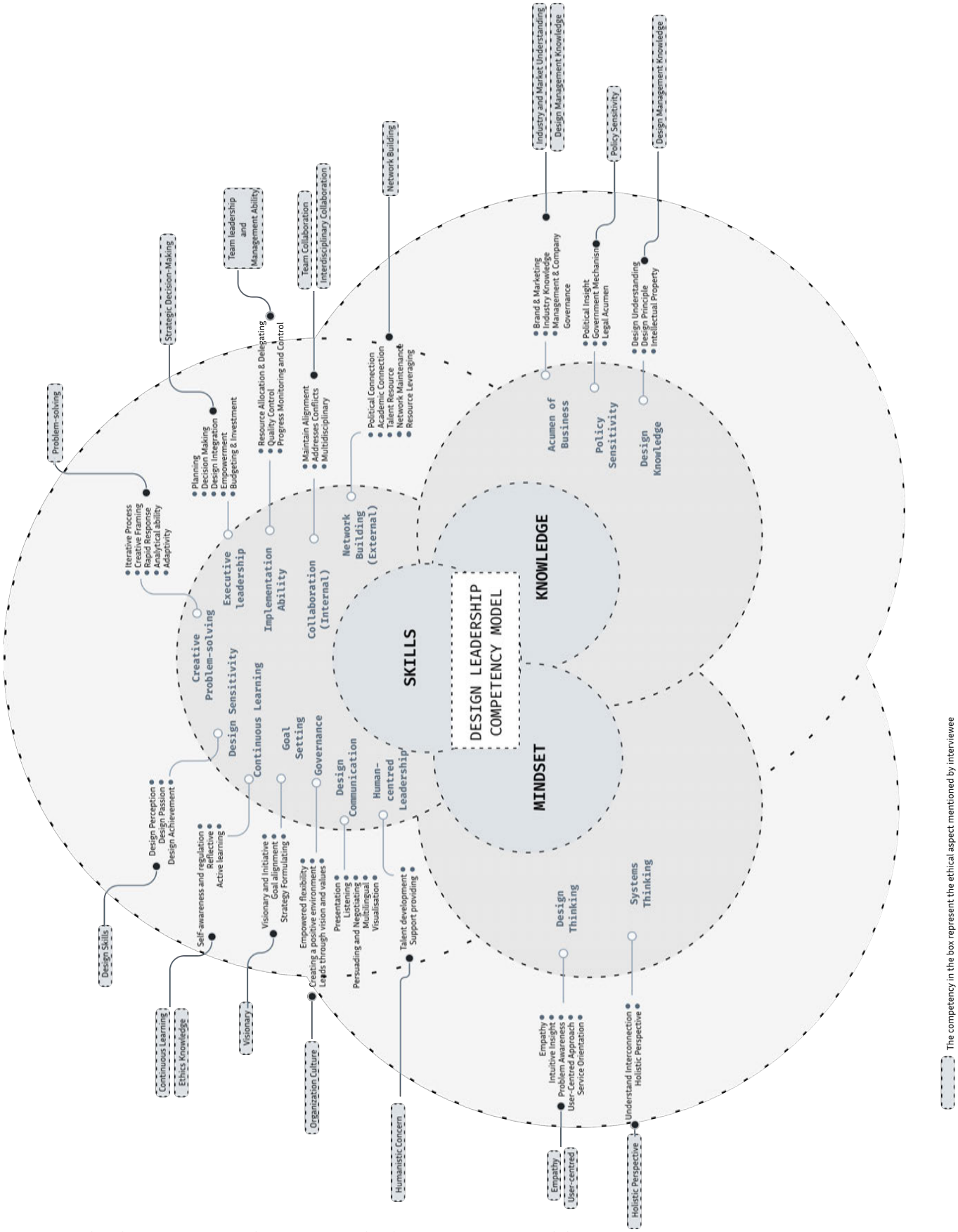

Figure 1: Ethical Competency in the Design Leadership Competency Model

Design Sensitivity refers to a design leader's ability to perceive and interact with the world and to create impactful design work. According to the interviewees, design sensitivity is not only essential for achieving aesthetic and functional excellence but also plays a critical role in integrating ethical considerations into both the design processes and outcomes.

Continuous learning empowers design leaders to reflect on their capabilities, identify learning needs, and acquire new knowledge. This competency is essential for staying informed about emerging ethical challenges and their everchanging nature, including sustainable practices and evolving societal expectations (Bagnall et al., 2022). A design leader must demonstrate the ability to anticipate future trends, particularly those involving ethical considerations, by analysing past and current events while maintaining a broad, clear vision for the future. This competency enables design leaders to identify emerging challenges and opportunities in areas such as sustainability, inclusivity, and social responsibility. By aligning their strategies with evolving societal expectations, visionary leaders ensure their work remains relevant and impactful.

Visionary leaders possess a keen ability to detect potential ethical risks and opportunities early, providing valuable insights that guide long-term strategic directions. By integrating ethical foresight into their vision, these leaders not only inspire their teams to innovate responsibly but also shape design solutions that positively impact both business success and societal well-being. Interviewees highlighted the importance of long-term thinking in ethical leadership:

> "Moral responsibility requires a long-term perspective. Leaders must focus on long-term benefits, ensuring that their decisions genuinely help those they serve." – Int8 DM Student

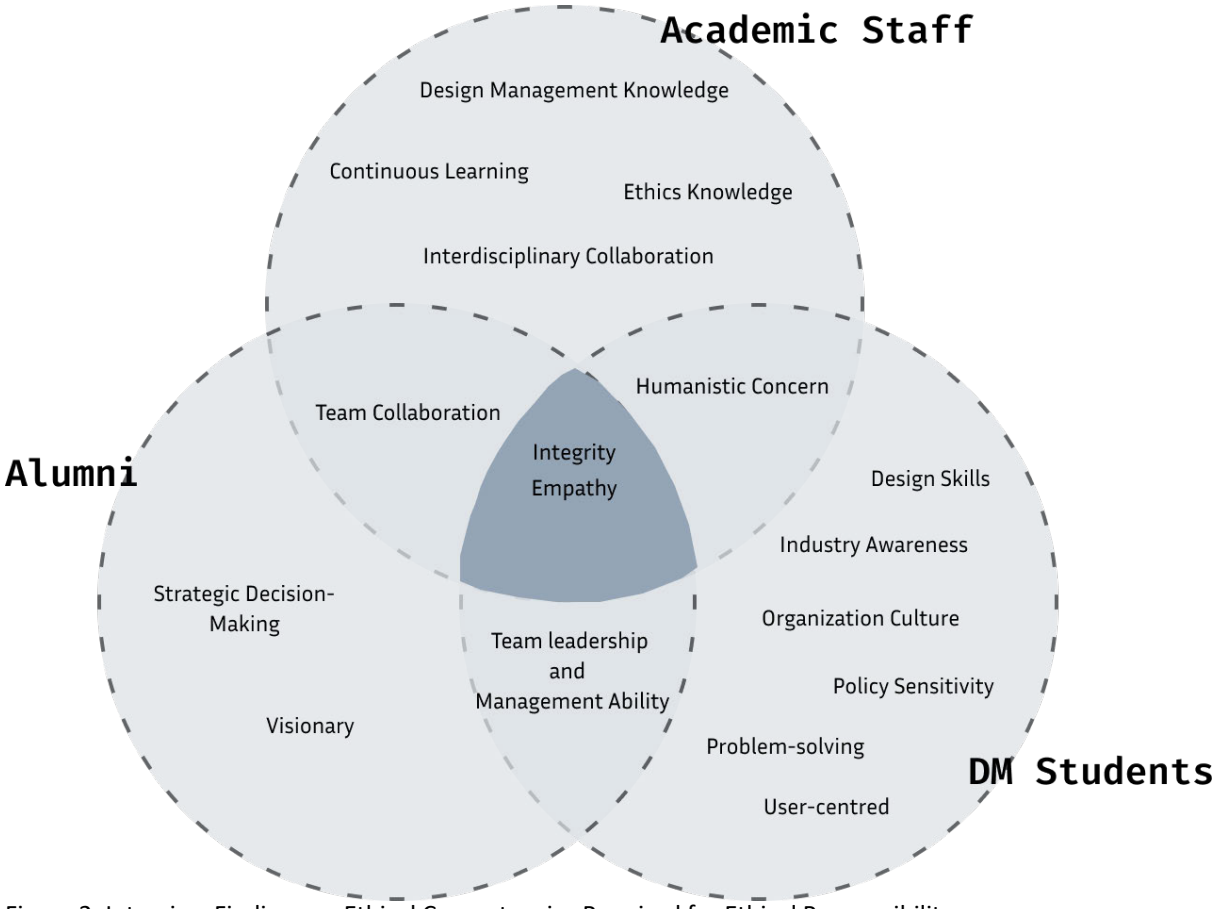

Figure 2: Interview Findings on Ethical Competencies Required for Ethical Responsibility

A design leader demonstrates **humanistic concern** by offering guidance and assistance to enhance the skills and potential of their team members while supporting them through

challenges. This competency reflects a deep ethical commitment to prioritising the well-being and development of individuals within the organisation.

> "A design leader must have a mindset dedicated to serving others and reflecting personal values aligned with helping people." – Int2 DM Student

Empathy is a critical competency for design leaders, enabling them to understand the perspectives and emotions of others. Empathy is the foundation for a **user-centred** approach, allowing design leaders to prioritise the needs and experiences of diverse stakeholders, particularly those from marginalised or minority groups. Empathy enables design leaders to not only connect with stakeholders but also create thoughtful and inclusive solutions that reflect ethical considerations. Interviewees across three groups all underscored the importance of empathy in ethical leadership:

> "First of all, they need to have empathy—a certain ability to empathise with others. They need to first establish an awareness of their societal responsibilities before they can take the next step." – In10 Alumni

Integrity emerged as a highly emphasised personality trait across all interviewee groups in the interviews, underscoring its importance within the ethical dimension of design leadership. They believe that design leaders must possess honesty, strong moral values, and a commitment to ethical behaviour.

> "Human nature is inherently good, and this is something that will never change. This is extremely important for ethical design leadership." – Int12 Academic staff

Although integrity is not explicitly included in the design leadership competency model due to its inherent nature as a personality trait rather than a teachable skill, it remains crucial for promoting the ethical dimension of design leadership. While it is challenging to teach integrity within the framework of design education, understanding its importance helps highlight its function in reinforcing ethical behaviour and guiding leaders toward responsible and impactful practices.

4.2 Insights on Ethical Responsibility in DM Education

The understanding of ethical responsibility varied across different participant groups (academic staff, students, alumni), with some emphasising its importance less or more than others. The academic staff appeared to demonstrate the most comprehensive understanding of ethical responsibility, followed by design management students, while alumni seemed less knowledgeable. This suggests that the curriculum may have been updated to better incorporate ethical aspects over time. Furthermore. Ethical considerations are usually viewed as an extension and complementary part of design management curriculum, rather than a core learning outcome in the first place.

Academic staff identified 11 distinct aspects of ethical responsibility, spanning environmental, societal, and organisational concerns:

- *Environmental Issues*, such as addressing consumerism's impact on the environment (e.g., fast fashion), tackling ocean pollution, and promoting sustainability;
- *Societal Issues*, such as solving community challenges, creating jobs to reduce unemployment, addressing mental health concerns among the younger

generation, developing inclusive design, and safeguarding user privacy;
- *Organisational Context*, such as cultivating holistic perspectives, raising employees' ethical awareness, promoting inclusive design, increasing intellectual property (IP) awareness, and improving IP protection.

Design management students shared some overlaps with academic staff, particularly on societal issues, but placed greater emphasis on:

- Preserving Cultural Values and ensuring cultural heritage is reflected in design;
- Inclusive Design and developing designs that serve diverse user groups;
- Environmental Responsibility and taking steps toward sustainability.

Additionally, students highlighted the need for equitable distribution of design resources, criticising the concentration of resources among higher-ranking individuals while neglecting those at the middle and lower levels.

Alumni demonstrated a narrower understanding of ethical responsibility, focusing primarily on organisational contexts, such as:

- Ensuring fair employee benefits,
- Promoting ethical decision-making,
- Fostering an inclusive and equal workplace atmosphere.

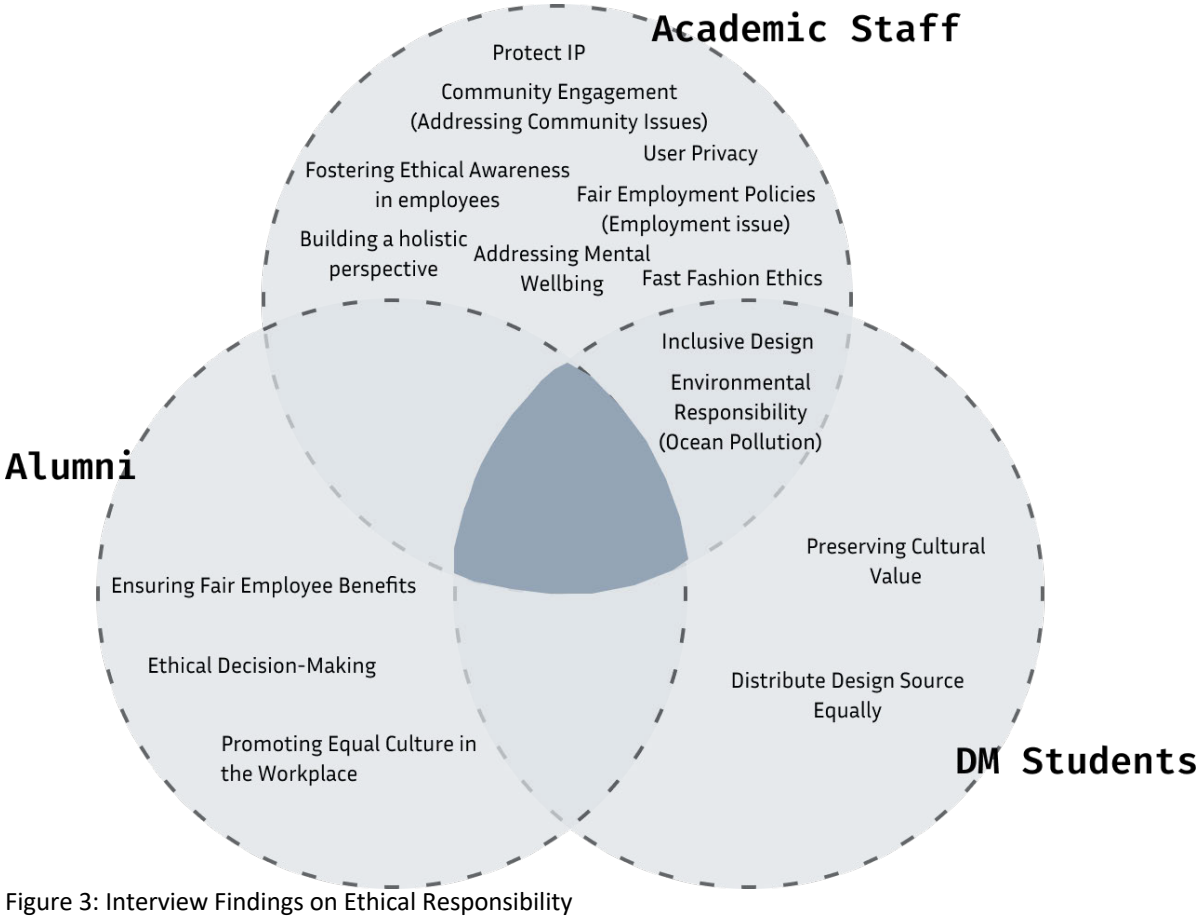

Figure 3: Interview Findings on Ethical Responsibility

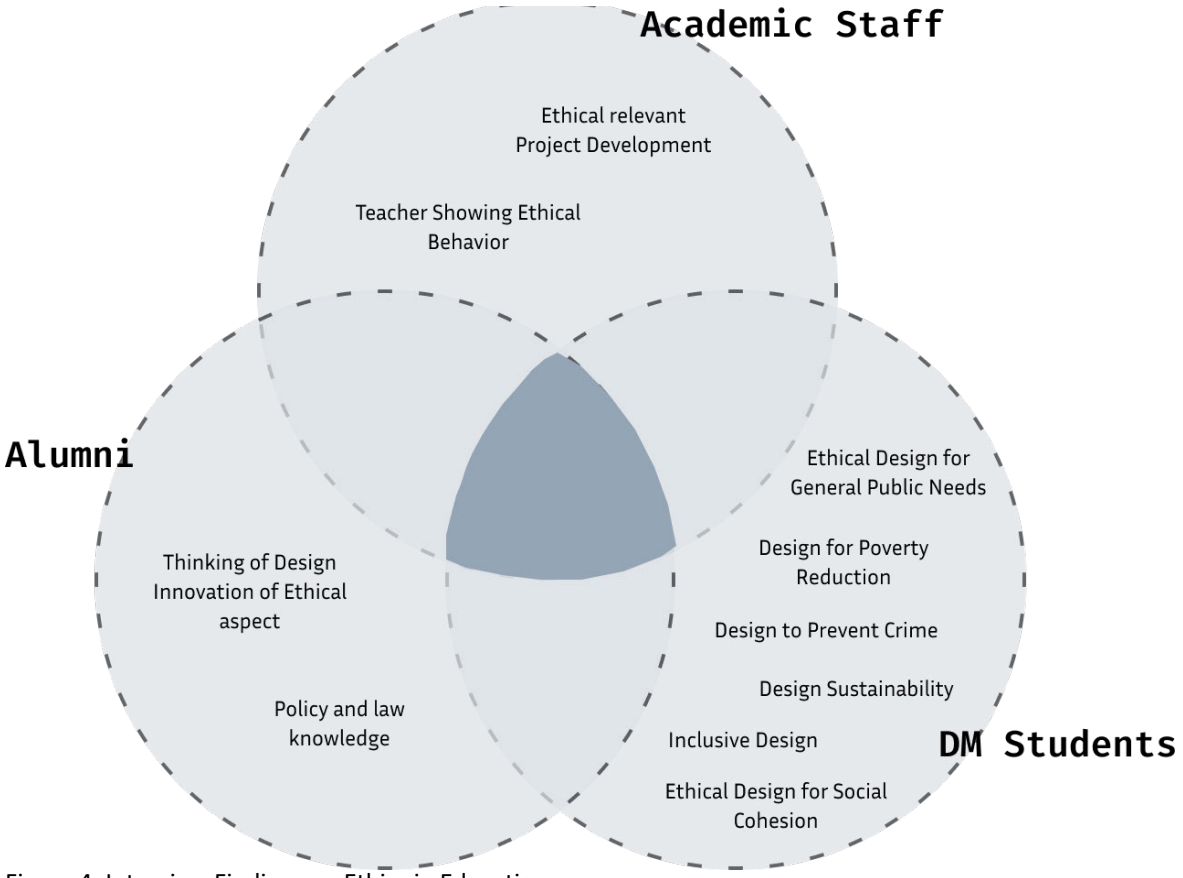

Figure 4: Interview Findings on Ethics in Education

Academic staff explained how ethical aspects are integrated into the design management program, primarily through project-based learning. Teachers prepare assignments with ethical themes, such as sustainability or social inclusion, and guide students in exploring these themes in their projects. However, there are difficulties in accessing public resources now, such as a lack of sustained industry involvement: guest lecturers from the industry often deliver one-off lectures rather than providing continuous engagement throughout an entire term, which could foster more consistent skill development.

Without sufficient support, most project themes or topics are selected based on the teacher's own understanding and experience or perspectives. This can ensure a certain level of quality and effectiveness in shaping students' perceptions and understanding through the project. However, this also highlights a potential limitation: without external, especially industry, involvement or validation, these topics or ideas may lack alignment with current industry practices, resulting in project outcomes that are idealistic and hard to implement in real-world scenarios.

Academic staff also emphasised the importance and challenge of role-modelling ethical behaviour. They believe that cultivating ethical awareness is a lifelong process and goes beyond classroom learning. Teachers aim to inspire students by demonstrating ethical behaviour in daily interactions, providing a practical complement to theoretical knowledge.

From students' insights, when asked about their ethical learnings in class, most students were impressed by contents and cases of addressing public needs, such as:

- Design for addressing poverty,
- Inclusive design for diverse user groups,
- Design in improving community and societal engagement,

- Design against crime, and
- Sustainable design.

From Alumni's perspective, they recalled learning about ethical aspects through discussions on design innovation and exposure to policies and laws relevant to ethical practices. However, one alumnus shared that knowledge can provide valuable foundational frameworks, but the ethical aspects were not often learned or emphasised in their education. This raises a question about ethical cultivation: can ethics be "learned" or "taught" in design education? About the teaching of ethics, it is now has been reached a consensus that ethics can be taught (Avci, 2017).

Ethics as foundational knowledge can be taught through methods often implemented by lectures, case-based teaching and group discussions (Avci, 2017; Bruns et al. 2015; Laabs 2015), and should be emphasised in education (Avci, 2017; Vynckier et al. 2015). However, the cultivation of ethics should extend beyond knowledge transfer. Cultivating ethical design leadership, is not just about understanding rules or frameworks but also about developing the capacity for ethical leading and decision-making in complex situations (Brown et al. 2005; Kaptein, 2019).

As one academic staff emphasised in the interviews, role modelling plays a vital role in fostering ethical awareness and shaping ethical behaviour (Grande et al., 2024) and motivation (Gladstone and Cimpian, 2021), to influence the process or work in design project (Donia and Shaw, 2021; Grunwald, 2001; Timmermans, 2017). While foundational ethics knowledge can be taught and learned, cultivating an ethical mindset among students may be more important, and requires an experiential (Goralnik et al., 2012) and comprehensive approach. This includes combining classroom learning with a real-world application lens, and incorporating reflective practice outside the classroom. This approach can create a holistic approach to cultivating an ethical mindset.

5. Discussion

5.1. Ethics in 'Neutral' Competencies

Some competencies do not inherently possess an ethical dimension but can make an ethical impact depending on the context in which they are applied. For instance, **strategic decision-making** can be ethical, but this sometimes depends on the values of the individual or organisation (Haralick, 1983; Papadakis et al., 1998; Shepherd and Rudd, 2014). If a person or organisation prioritises profit and financial success—particularly in situations where the organisation is in its early stages and focused on survival—they may decrease some considerations such as environmental sustainability. This can result in unethical outcomes, such as pollution or resource depletion, due to a lack of emphasis on sustainable practices.

Similarly, **network building**, as a competency, is neutral and does not inherently carry a moral aspect. However, ethical issues can arise in certain contexts (Melé, 2009). For example, collaborating with companies or organisations that have low ethical standards or awareness can lead to unintended consequences, such as supporting exploitative practices. Additionally, network building may marginalise certain individuals or groups and cause inequality by excluding those who lack access to influential networks or resources.

5.2. Potential Ethical Conflict Between Competencies

There are also conflicts between certain competencies, particularly when they are applied in ethical practices. For example, the **industry and market understanding** competency, which often prioritises profitability and market demands, may conflict with **humanistic concern** when those demands result in products or practices that negatively impact individuals or society.

One example is **addictive technologies**, which are designed to satisfy users' needs and engagement, meeting market demands and boosting profitability. However, such technologies can harm users by fostering addiction, reducing productivity, and negatively impacting mental health. Similarly, **fast fashion** sell producing low-cost, high-turnover products that fit with fashion trends. While this aligns with market demands and drives profitability, it directly contradicts humanistic concerns, as it often compromises fair labour conditions (Tandon et al., 2025; Turker & Altuntas, 2014) and sustainability.

5.3. Uncovering Bias in Ethically Relevant Competencies

As a competency, it is essential to consider the **cultural** or **contextual biases** (Banuri et al., 2019; Pope et al., 2018) that may influence its application. For example, **policy sensitivity** assumes that existing policies are inherently ethical. However, what happens when certain policies may include inequality or harm? One alumnus shared a workplace case concerning compensation for employees who experienced workplace accidents. She noted that, while she empathised with the affected employees' situations and wished to provide greater compensation, regulations limited the amount she could offer. She realised that policies and regulations sometimes prioritise institutional compliance over individual rights, creating an ethical dilemma. This situation underscores the challenges design managers face in balancing adherence to policy frameworks with addressing ethical considerations from a human-centred perspective.

6. Conclusion

This paper focuses on the ethical dimension and validation of the design leadership competency model. Through the validation process, ethical aspects were identified across all 16 competencies, such as design thinking, continuous learning, and visionary. The findings reveal the impacts of ethical leadership in design education. Furthermore, traits like integrity, while not directly teachable, were emphasised in the interviews as a vital role in ethical leadership and impacting design leaders.

This paper also highlights the relevant ethical leadership competencies required in design-driven entrepreneurship in the Chinese context, providing a direction for cultivating ethical design leaders in future design education programs.

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From Conflicting Values to Shared Purpose

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ABSTRACT | This paper studies how design thinking has transformed an outdoor tourist business (X-Company) to an educational platform. Throughout its development, sustainability functions as a key principle of the business and leads to inspiration of ethical practices. The story is a vividly illustration of how design thinking can play an effective role in navigating dilemmas of decision making caused by conflicting values.

The case study starts from introducing the background of X-Company and how design is brought into the business decisions. It is an ongoing story started over seven years ago, when a designer was asked to explore opportunities to extend marketing potentials of a newly developed outdoor business through improvement of user experiences. Whereas the designer realized the potential negative environmental impact by bringing mass tourists to the precious nature beauties. Followed by explaining how design functions in X-Company, which includes organizational structure of design capability, responsibility of design, methods and tools used. The main part of the observation focused on how X-Company has redefined its mission statement, changed its product offerings, and made the transformation from a heavily natural resource dependent outdoor tourist to an educational platform on sustainability through controlled access to carefully selected outdoor locations. And later the business was brought into metropolitan areas to revitalizing abandoned factory facilities, and became partners of well-developed large businesses and organizations.

Winterhouse Pathways, a strategic framework developed by Winterhouse Institute, used by the design team during its effort of transforming X-Company will be explained. It is a matrix tool to help business map and visualize key milestones during its development. In this case, the method is used as modification and exploration to understand personal growth as designer to cultivate leadership in aligning with entrepreneurship of long-term strategic, social transformation and sustainability pathways.

In conclusion, this paper offers a comprehensive exploration of how design thinking serves as a transformative force in both leadership and entrepreneurship. By bridging the gap between creative problem-solving and ethical leadership, design thinking provides a blueprint for building businesses that are not only economically viable but also socially responsible and environmentally sustainable. Through the analysis of case study, we aim to contribute to the ongoing dialogue on the role of designers as ethical leaders in the global business landscape.

KEYWORDS | Design Thinking, Design-driven Leadership, Creation of Values

1. A Business Opportunity that Resonates Future Generation

1.1 X-Company and its Outdoor Climbing

X-Company, established in 2017 in Zunyi, Guizhou Province, China. It operates as a specialized outdoor tourism enterprise focused on rope climbing. Its flagship facility, the Top-rope Climber Rope Climbing Base (see Figure 1), representing a RMB 40 million investment and adheres to IRATA ICOP European industrial safety standards. The company's core operations center on vertical rope climbing, a discipline that enables three-dimensional exploration of natural environments. This specialization has driven diversification into complementary sectors, including customized adventure tourism, extreme sports programming, and technical training for high-altitude professions. By integrating rope climbing with nature-based tourism, X-Company provides urban populations with structured access to remote natural landscapes, promoting human-nature interaction. Its operational framework combines certified rope techniques, standardized instructional protocols, and purpose-built infrastructure, positioning it as a pioneer in China's evolving outdoor tourism sector. The company's model demonstrates how niche adventure activities can catalyze market expansion while addressing growing consumer demand for experiential, environmentally engaged tourism.

Figure 1. X-Company Rope Climbing Base

This study has been authorized by X-Company to use data and content from interviews, workshops, photographs, and other sources; however, the company name cannot be disclosed. It investigates the application of design-driven leadership in shaping the business strategy of X-Company, with a focus on sustainable business model innovation.

1.2 Conflicting Values in Sustainable Tourism

The contemporary tourism sector, recognized as a multi-dimensional industry encompassing strategic economic development, well-being enhancement, and livelihood sustainability, has witnessed intensified scholarly discourse on the design of sustainable tourism paradigms. Rising disposable incomes and consumption have substantially expanded tourism markets, driving demand for experiential offerings and premium services. Paradoxically, this growth trajectory has been juxtaposed with unprecedented sectoral disruptions, as recurrent COVID-19 outbreaks act as transformative catalysts—accelerating digital adoption, safety protocol integration, and destination hyper-localization. While these dual forces demonstrate tourism's adaptive capacities, their enduring implications for industry structures, labor ecosystems, and sustainability commitments remain indeterminate.

Green tourism development confronts critical challenges that impede its values and long-term viability (see Figure 2). A central issue is the misalignment between theoretical environmental standards and practical implementation. Despite claims of sustainability, projects frequently lack rigorous enforcement mechanisms, resulting in superficial ecological safeguards and diminished outcomes. A persistent tension exists between economic imperatives and environmental preservation. Commercial entities often prioritize short-term profitability, adopting practices such as infrastructure overdevelopment and unsustainable operational models. This prioritization is particularly evident during initial project phases, where immediate financial returns supersede commitments to ecological stewardship, undermining the foundational principles of sustainability. Tourist engagement presents another barrier. The success of green tourism hinges on visitor participation in sustainable behaviors, yet many initiatives inadequately cultivate environmental awareness or incentivize responsible practices, reducing their transformative potential. Concurrently, fragmented collaboration among stakeholders—governments, private enterprises, tourists, and local communities—exacerbates inequitable resource distribution and obstructs cohesive governance, further compromising project continuity. Addressing these challenges necessitates systemic integration of ethical principles into project frameworks.

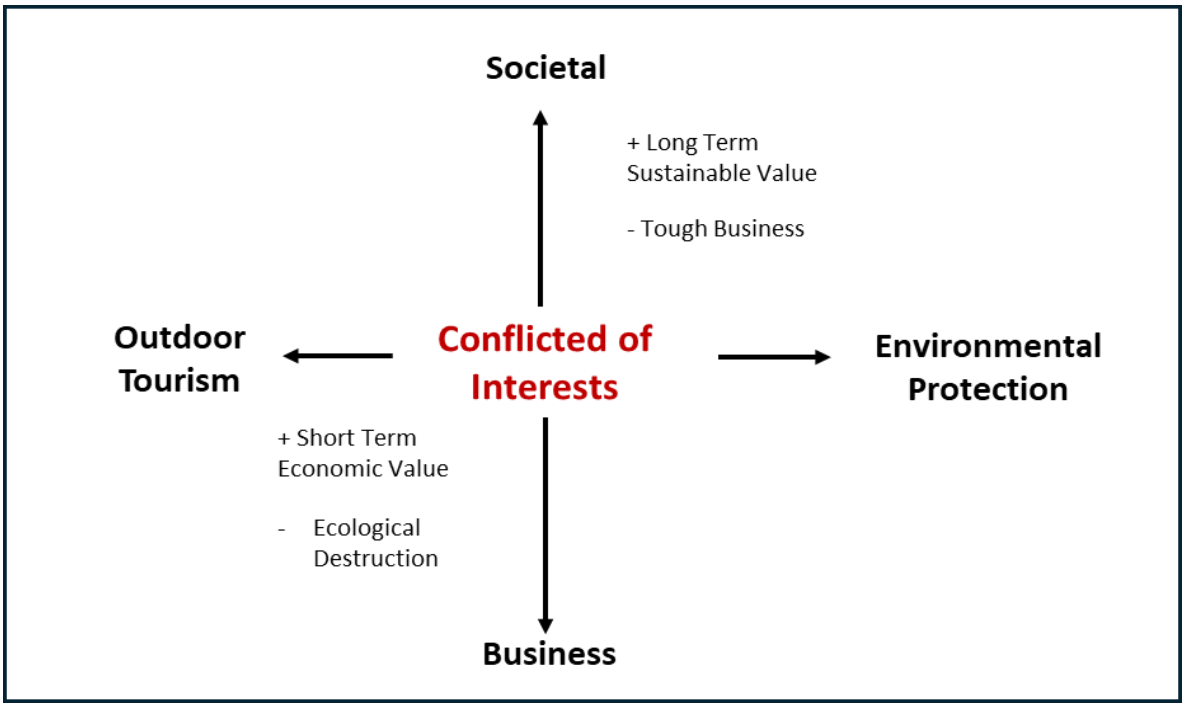

Figure 2. Conflicting Values in Sustainable Tourism

2. Integration of Design Thinking into Company-X

2.1 Designers Act as External Agencies

Following the disruption caused by the COVID-19 pandemic, the global tourism and outdoor sports sectors experienced profound challenges, with X Company confronting significant operational pressures by 2022. The company faced stagnation in acquiring new customers, alongside a marked decline in retention rates. Simultaneously, tensions emerged within the organization, particularly between the profit-driven strategies of management and the professional staff's advocacy for sustainable practices and improved customer engagement. This divergence in priorities generated strategic ambiguity, complicating decision-making and impeding effective crisis management.

In light of these difficulties, the founder—despite not possessing a formal background in design—recognized the urgent need for leadership capable of bridging these competing priorities, fostering innovation, and aligning organizational practices with evolving market demands. The founder's approach was shaped by an academic conference at which a keynote on design-driven organizational leadership profoundly influenced their perspective. The speaker's discussion emphasized the importance of integrating design thinking into leadership to resolve internal conflicts, enhance organizational coherence, and better meet the needs of a rapidly shifting market.

Inspired by this insight, the founder extended an invitation to the keynote speaker and their team to engage with X Company, with the aim of embedding design thinking principles into the company's leadership framework. This initiative marked a strategic effort to address the internal tensions and external challenges facing the company, with the goal of developing a more sustainable, customer-centric approach to business operations in the post-pandemic context. The integration of design-driven leadership was thus seen as essential for aligning organizational strategies, fostering innovation, and effectively navigating the complexities of the new market environment.

2.2 Design Thinking as A Strategy for Navigating Complex Decisions

Design thinking offers a pathway to reconcile competing priorities by fostering innovation through stakeholder-centric problem-solving. This approach emphasizes iterative, interdisciplinary strategies to harmonize economic objectives with ecological integrity, ensuring scalable and equitable sustainability outcomes.

These challenges highlight the necessity of applying design thinking to reframe sustainability as a mechanism for value creation rather than mere regulatory compliance. Winterhouse Social Design Pathways (The following text will refer to "WSDP"). illustrates this approach through iterative prototyping of socio-technical systems, such as waste management networks and community benefit-sharing models, demonstrating how ethical leadership can convert risks of greenwashing into regenerative strategies for placemaking (Nelson & Stolterman, 2012). This method emphasizes the systematic integration of systems thinking and participatory co-design to align economic feasibility with the preservation of biocultural heritage, ensuring mutually reinforcing ecological and social outcomes.

Sustainable business development inherently involves addressing "wicked problems," characterized by tensions between economic costs and ethical values, misaligned

stakeholder expectations, and challenges in fostering sustained engagement among target groups. For X-Company, the priority in its early stages lies in cultural transformation and sustainable community development, rather than product innovation. Design thinking, a co-creative methodology for resolving complex, conflicting challenges, has gained prominence in corporate and entrepreneurial contexts. Rooted in Herbert A. Simon's conceptualization of design as a process of "creating ideas" rather than merely deconstructing them (The Sciences of the Artificial, 1969), the approach evolved through Horst Rittel's exploration of planning dilemmas (Dilemmas in a General Theory of Planning, 1973). Richard Buchanan later formalized its application to "wicked problems" in design contexts (Wicked Problems in Design Thinking, 1992), highlighting irreconcilable conflicts between competing priorities: economic and business objectives versus socio-cultural values, and short-term micro-level gains versus long-term macro-strategic imperatives. These tensions underscore the necessity of integrating systems thinking and participatory co-design to balance competing demands while advancing ethical and sustainable outcomes.

Design thinking lacks a universally agreed definition but is broadly recognized as a multidisciplinary problem-solving approach integrating human-centered innovation, technical feasibility, and business viability. Tim Brown (2008) characterizes it as a human-centric methodology that aligns market opportunities with customer needs through creative business strategies. Similarly, Johansson-Sköldberg (2013) emphasizes its role in bridging diverse disciplines, cognitive frameworks, and mindset integration. Scholar Li Yinan (2017) extends this perspective, framing it as a collaborative process that leverages cross-domain expertise to systematically address user needs through culturally informed creative practices. Despite definitional ambiguities, design thinking has gained traction across academia and industry for its capacity to address complex challenges. Its practical impact is evident in cases such as Apple, where iterative design processes drove innovations like the iPhone and strategic business models. IDEO further institutionalized the approach, embedding it into organizational culture to guide project development and strategic decision-making. Industry leaders like Juan Carlos Baumgartner advocate its future role in solving unpredictable societal and organizational challenges (Lingyan, 2015). These applications underscore design thinking's potential to transcend traditional boundaries, offering a framework for addressing systemic issues such as ethical business strategy formulation, socio-technical innovation, and adaptive responses to global uncertainties. By prioritizing empathy, experimentation, and interdisciplinary collaboration, it positions itself as a critical tool for fostering sustainable, value-driven solutions in both entrepreneurial and societal contexts.

2.3 Design Thinking Became Driving Force of Transformation

The design team's brought design thinking into X-Company played a crucial role in its business transformation, operating both externally as consultants and internally as strategic decision-makers. Externally, the design team brought specialized expertise in design thinking, providing objective insights and innovative methodologies to address the company's operational and strategic challenges. This consultancy role allowed X Company to reassess its practices and adopt a user-centered approach to problem-solving, fostering a more adaptive and innovative mindset within the organization.

Internally, the design team worked closely with X Company's leadership, directly influencing key decision-making processes. By embedding design thinking into the company's strategy development, the team ensured that business decisions were more customer-centric and aligned with emerging market trends. The team's involvement helped

streamline internal operations, resolve conflicts between management and staff, and promote a culture of collaboration and innovation.

This dual involvement, both as external consultants and internal collaborators, was instrumental in driving X Company's business transformation. Through this approach, the company was able to reorient its strategies, improve its customer engagement, and position itself more effectively in the market, ensuring long-term sustainability and adaptability in a rapidly evolving business environment.

A. Defining Brand Culture of X Company

Slogan: With ropes, we connect people to nature; from above, we see the world differently.

Mission: To enable individuals to experience joy, rediscover themselves, and become responsible global citizens through exploring nature and overcoming challenges.
Vision

Vison: To become the most trusted professional training center for rope operations and to establish Guizhou as a global destination for high-altitude adventure tourism.

B. Finding Key Opinion Customer

The acceptance and adoption of new products or innovations by the general public typically follow a sequential process, necessitating a phased market development strategy. This approach begins by targeting an early adopter segment, whose influence can facilitate the expansion of the market to a broader audience. Over time, through product diversification, the strategy aims to penetrate and influence the laggard market. Consumers characterized by an open mindset and substantial resources are particularly drawn to X-company's distinctive products. These individuals not only exhibit a strong affinity for innovation but also possess the capacity to generate significant publicity and market influence for the company. Based on an analysis of user segmentation and dynamic user profiles, the authors recommend prioritizing innovators, adapters, and experiencers as the initial target groups for market entry.

According to Everett M. Rogers' Diffusion of Innovation Theory (Rogers, 1962), the widespread acceptance of innovative products is typically driven by early adopters. Innovators, trendy achievers, and experiencers, as key social groups, are often at the forefront of societal development and play a critical role in driving innovation. These individuals are predisposed to leading trends, embracing novel ideas, and serving as influential opinion leaders within public discourse. As such, these three groups are instrumental in introducing X-company’s brand and the concept of "rope climbing" to the broader public, ensuring that early investments in product development, services, and promotional activities yield maximal returns. Moreover, these groups can be further refined and segmented based on factors such as profession and social role, enabling the strategic targeting of specific subgroups for product promotion. Examples of such subgroups include EMBA followers, university organizations, executives in internet companies, executives in start-ups, middle-class families, and outdoor enthusiasts. This targeted approach enhances the precision and effectiveness of market entry strategies.

C. Repositioning of X Company

X Company’s brand development and business planning are based on a thorough analysis of global and domestic trends in the outdoor tourism industry. Drawing from market data and an evaluation of the company's existing strengths, technological capabilities, and resource reserves, the team has identified six core business lines to drive its future growth. These business lines align with X Company’s mission, vision, and values

and serve as the strategic foundation for the company's expansion. Initially, X Company's business model was relatively narrow, focusing mainly on a single aspect of outdoor tourism. However, with the involvement of designers, the company was able to break out of this limited framework. The design thinking process helped identify opportunities for innovation and business diversification. Designers worked closely with key decision-makers to explore new business avenues, helping the company shift from a singular focus to a more expansive and integrated strategy. As a result, the six business lines (see Figure 3) now form a comprehensive, interconnected model that allows X Company to reach a broader audience and achieve greater market impact.

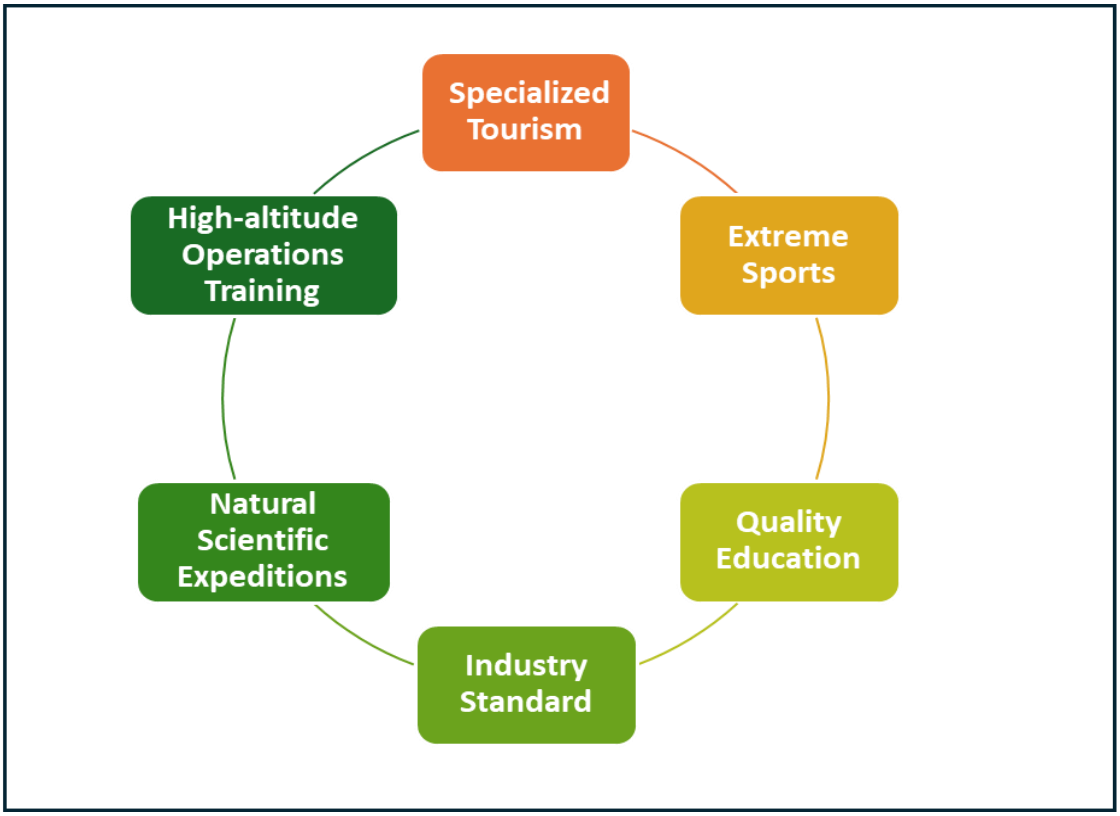

Figure 3. Six Business Lines

1. Specialized Tourism:
The tourism business line targets both domestic and international markets. By leveraging Zunyi's Red Tourism as a major attraction, X Company draws large numbers of visitors from across China. Furthermore, the company utilizes the unique Karst and Danxia landforms in its surrounding areas to create outdoor adventure tourism products, particularly rope-based activities, that cater to a wide range of consumer groups.

2. Extreme Sports:
The extreme sports line focuses on the development and sponsorship of rope-climbing events. This strategy not only promotes the sport but also enhances X Company's brand visibility in both public and industry sectors. Through collaborations with government agencies, private organizations, and media platforms, the company aims to establish itself as a key player in the event-driven tourism market.

3. High-Altitude Operation Training:
This business line capitalizes on the company's technical expertise by providing specialized high-altitude rope access training and certification for industries such as law

enforcement, firefighting, construction, and industrial operations. Additional services include safety assessments and high-altitude rescue training, positioning X Company as an industry leader in safety and technical education.

4. Quality Education:
Quality education represents a strategic cross-sector development for X Company. By utilizing its natural resources, the company offers educational programs that help build a positive public image and foster long-term relationships with family-oriented consumers. Entering the educational sector early gives X Company a competitive edge in the growing market for adventure-based and sustainable education.

5. Scientific Research and Exploration:
X Company's commitment to social responsibility is exemplified in its scientific research and exploration initiatives. The company plans to build an internal research team and collaborate with external experts in environmental and ecological fields, furthering scientific progress and enhancing the company's role in societal development.

6. Industry Standards Development:
The establishment of industry standards is essential for X Company's long-term sustainability and its goal of becoming an industry leader. By contributing to the development of operational and safety standards, the company can strengthen its position in the market and build trust with both consumers and industry stakeholders.

D. Introduction on WSDP: A Pragmatic Tool to co-organize Fragmented Activities

WSDP, launched in 2013 by the Winterhouse Institute in collaboration with international designers and educators, offers a structured framework for social impact design. Designed for educators and practitioners, it provides tools to identify and mobilize resources and expertise needed to address complex social challenges across different scales. The framework operates as a matrix tool, helping businesses and organizations visualize key development milestones to achieve meaningful social impact.

In the context of X-Company, the horizontal axis of the Pathways matrix defines its organizational evolution. The "individual or independent team" represents the startup-phase professionals, often skilled in rope climbing and handling multiple roles. The "interdisciplinary team" reflects its growth phase, incorporating expertise from fields like marketing, business management, education, and design. The "cross-functional organizational team" signifies its mature phase, collaborating with entities such as government, media, real estate, and educational institutions to form a shared-interest community. On the vertical axis, "individual products or services" denote specific offerings like outdoor tourism routes. "Systemic innovation" refers to resource integration, such as a rope technology system combining training, certification, and safety testing. "Cultural transformation" captures broader societal impacts, like rope climbing becoming a mainstream activity influenced by celebrity endorsements or replacing golf as a preferred high-end sport. This framework illustrates X-Company's strategic development and cultural influence.

The adjustment of user profiles, integrated with WSDP tool, providing a macro-level framework for the development trajectory of X-Company, shifting from specific tourism products to a broader cultural impact across various societal domains. The user profiles are aligned with the company's product planning by employing a segmentation model that includes early adopters, mainstream users, and laggards. The early adopters are classified as innovators, trendy achievers, and experiencers; mainstream users consist of

traditional achievers, strivers, and adapters; and laggards include preservers, sustainers and strugglers. These user segments were developed based on the VALS model. Through this persona analysis, three distinct product development pathways were identified, providing strategic guidance for X Company's growth.

In the extreme tourism business line for Case A, X-Company should follow a structured development path (see Figure 4): (1,1) -(1,2) –(1.3) -(2,3) -(3,3) -(3,2).

Figure 4. WSDP for "Extreme Tourism Business"

The focus point is high-end outdoor tourism products aimed at individuals such as EMBA graduates, senior corporate executives, and specialized groups, including photographers and seasoned outdoor enthusiasts. The company emphasizes value-added services and collaborates with partners to offer a variety of thematic experiences, such as "Exclusive Outdoor," "Extreme Photography," and "Geographic Exploration." These offerings primarily include skill development, outdoor activities, and knowledge-sharing events, designed to provide a holistic tourism experience that integrates travel, social interaction, and intellectual engagement. This approach targets high-end and niche markets with specific needs. Through user research, it was found that this target demographic does not prioritize the inherent playfulness or enjoyment of the activities themselves. Instead, their focus lies on the added value these experiences provide. For this group, a

pleasurable tourism experience serves as a fundamental component, while the meaningfulness and high added value of the experience take precedence. Consequently, X Company's product offerings are designed to meet these higher expectations, ensuring that the experiences deliver both intrinsic satisfaction and significant external value.

The value proposition for this user group lies in the opportunity to engage with individuals outside their usual professional and social circles, whom they would not typically encounter in their everyday lives. This expands their social networks and enhances their access to valuable resources. High-end tourism activities, in this context, serve as intermediaries, creating opportunities for meaningful connections. Rope climbing, with its cultural significance and high entry barriers, is well-suited to act as such a social mediator. By collaborating with media outlets that engage regularly with this target demographic, X Company can effectively position its offerings as premium products that appeal to high-end consumers, ultimately establishing rope climbing as a socially enriching experience within the luxury tourism sector.

Therefore, “Infinity X” is created through collaborations with international media and cross-industry brands. The offering includes X Company's core activities, such as venue-based programs, outdoor adventures, and leisure activities, alongside value-added events provided by strategic partners. These events include cultural salons, exhibition speeches, and entertainment competitions, enhancing the overall experience for the target audience.

3. Business Model Verified as Fruitful Outcomes

3.1 Adapting to Shifting Target Markets

Following post-pandemic policy relaxation, the authors applied design thinking at X-Company, initiating a transformative project in October 2023. Over 15 months, X-Company overcame its most challenging phase, achieving a 12% growth in revenues and a 32% increase in registered users compared to the pre-project phase. The design-driven solutions, implemented in phases across multiple dimensions, demonstrated significant success. This case highlights the potential of design thinking to foster organizational resilience and growth in complex environments. By integrating innovative, stakeholder-inclusive approaches, the project underscores the value of design principles in strategic decision-making, offering a model for sustainable development in dynamic business contexts.

3.2 Business Expanding from Mountainous Regions to Urban Markets

In early 2024, X-Company introduced the X Lighthouse Camp, an innovative tourism product themed as” The Great Voyage and Climbing to the Starry Sky”. The camp features six sections, including Voyage Adventure, where visitors engage in rope climbing and descent activities on a 4-meter wooden sailing vessel, complemented by themed photo opportunities. Additionally, X-Company collaborated with the Guangzhou Rainforest Ecological Botanical Garden (see Figure 5) to develop Rainforest Escape, a simulation of a primitive forest environment. This project allows visitors to apply rope skills and escape techniques to navigate simulated hazards, fostering both adventure and experiential learning. These initiatives highlight X-Company’s commitment to enhancing tourism through innovative, skill-based, and immersive experiences.

Figure 5. Urban Rope Climbing Base

3.3 Enhancing Influence through Recognition and Honors

The Summer Rope School (see Figure 6), designed for students, consisting of two components: the “Rope Climbing Class” and the “All-Round Summer Camp”. The Rope Climbing Class includes three sections: Rope Knowledge Learning, where students engage in hands-on activities like knot-tying; Outdoor Emergency Response Methods, teaching CPR and wound care using mannequins and medical tools; and Rope Rescue Demonstration, involving simulated rescues with rope systems. The All-Round Summer Camp extends learning to advanced challenges, such as outdoor cliff climbing, while promoting parent-child collaboration. Participants receive a completion certificate, recognizing their achievements. This program combines skill development, emergency preparedness, and family bonding, offering a holistic educational experience.

Figure 6. Summer Rope School

Furthermore, X-Company is dedicated to environmental sustainability and fostering responsible global citizenship. Having established 12 industry standards across training, safety, and ecological protection, the company keeps innovations constantly. In August 2024, it collaborated with experts, including Dr. Chen from the China Academy of Geological Sciences to develop the Guidelines for the Protection of Ecological and Landscape Resources in Karst Mountain Adventure Tourism in Guizhou Province. This initiative highlights X-Company’s commitment to preserving natural resources and

advancing sustainable tourism practices, setting a benchmark for environmental stewardship in the industry.

X-Company has partnered with Guangzhou's creative arts district to merge outdoor rope climbing with the artistic ambiance of its industrial heritage, creating a "Rope Culture" arts park. This initiative combines the historical significance of rope—a symbol of human progress—with the industrial heritage representing technological advancement, fostering a dynamic synergy. The project revitalizes the industrial site while promoting rope climbing as a culturally enriching activity, bridging sport, art, and heritage in a unique and innovative space.

4. Reflections and Value

Follow-up interviews with highly engaged customers underscored enhanced experiential immersion and strengthened connections to nature. Participants emphasized educational outcomes in skill-based and cultural activities, with increased propensity for organic promotion and expertise refinement. Many reported external recognitions, reflecting broader societal influence.

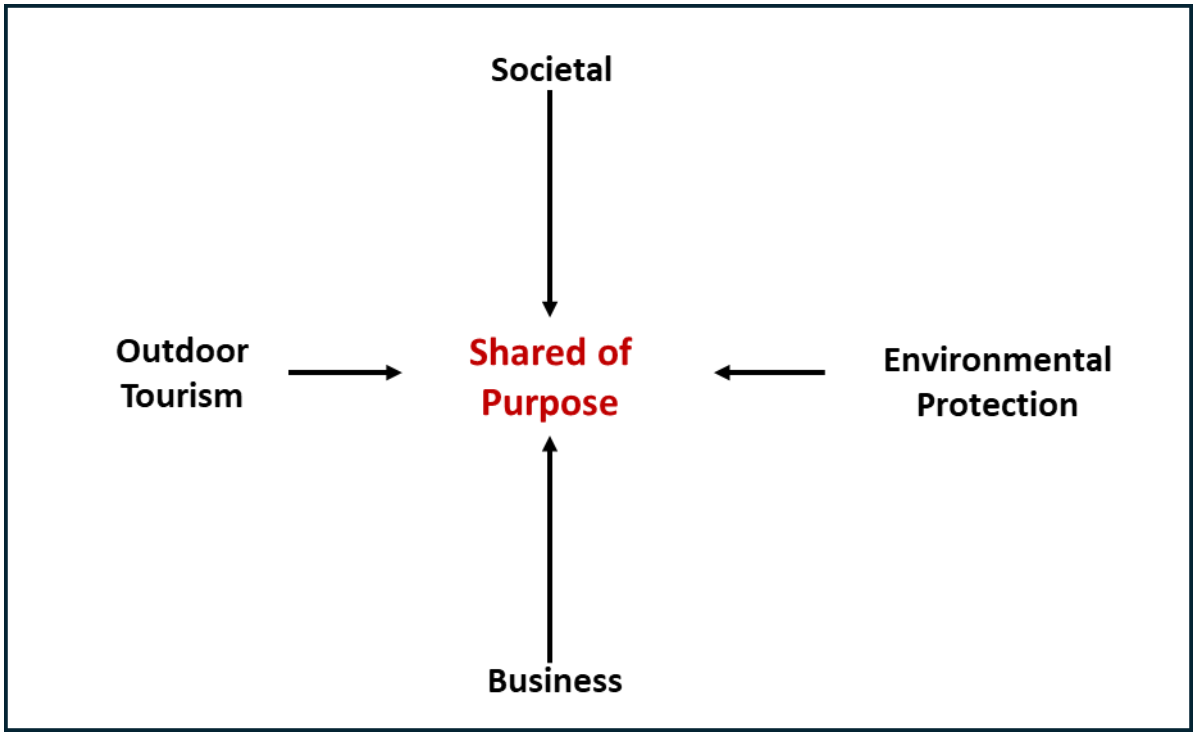

Figure 7. Shared of Purpose

X-Company's slogan, "With ropes, connect people to nature; from the heights, see a different world," metaphorically aligns with its strategic elevation through design thinking. The "heights" signify organizational transformation, while the "world" reflects a vision of sustainable business success (see Figure 7). This shift from "ropes" to "rope culture" exemplifies design thinking's role in reframing business development, offering insights into integrating cultural and innovative practices. The transition also addresses urbanization challenges by promoting a "future-oriented" lifestyle that harmonizes sustainability with human-nature connectivity, positioning X-Company as a model for interdisciplinary innovation.

The case study of X-Company's organizational transformation underscores the adaptability and value beyond its traditional applications. By implementing WSDP, which was historically confined to design practice, the project achieved three critical innovations. Firstly, it expanded the framework's theoretical scope by systematically integrating all stakeholders (e.g., employees, management, external partners) into the co-creation process, rather than limiting participation to designers. This inclusive approach fostered collaborative problem-solving and aligned organizational goals with diverse perspectives, demonstrating the potential of WSDP as a cross-functional tool for systemic change. Secondly, the project operationalized design thinking as a catalyst for self-reflection, enabling participants to critically re-examine their roles and responsibilities within evolving organizational structures—a dimension previously underexplored in WSDP literature. Thirdly, WSDP has catalyzed the emergence of previously absent ethical leadership mechanisms, fostering meaningful dialogue and creative ideation. Nevertheless, the focus of X-Company is relatively niche audience (e.g., a specialized rope-climbing initiative) which might raise questions about WSDP's scalability. To broaden its impact, future research should extend WSDP into contexts involving heterogeneous populations.

Ethical leadership represents not only an ideal but also an actionable framework through initiatives like WSDP. This study outlines a transformative pathway where design-driven entrepreneurship breaks traditional boundaries, cultivating ethical leadership through participatory methodologies that shift power dynamics in organizational governance. By integrating human-centered co-creation with strategic business transformation, WSDP pioneers a replicable model for embedding ethical imperatives into corporate practices.

Looking ahead, the fusion of design thinking and leadership development marks a new era, where creative professionals become architects of equitable systems and stewards of accountability. The capacity should be transformed from conflicted traditional decision-making hierarchies into interconnected ecosystems grounded in shared ethical responsibility. In an age of complexity, design-driven ethical leadership is not optional—it is the foundation for sustainable innovation, urging a renaissance in how we educate, practice, and create value. Through this, designers evolve into visionary leaders, with ethical frameworks guiding strategic progress.

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FROM THE PAST TO THE FUTURE (BY THE PRESENT): THE ROLE OF CURATORIAL LEADERSHIP IN ENHANCING LOCAL MANUFACTURING

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ABSTRACT | This contribution examines the role of the designer in relation to traditional applied arts and the local culture within the contemporary Italian context, intertwining theory, and practice. In recent years, the association between the advancement of design disciplines and highly specialized figures has shown signs of change, highlighting new boundaries as potential nodes of innovation (Da Empoli, 2013). There is indeed an increasing crossover between design and other disciplines, sciences, and techniques, based on the centrality of the product in its multiple expressions. The focus of this work is on the analysis of strategic and project outputs developed within the Art Lab partnership (Art Lab Net, Art Lab Experiences, Art Lab Services), supported by the Interreg Maritime Italy France programme, from 2017 to the present. These initiatives have aimed to support businesses in the manufacturing sector, addressing the challenges of global competitiveness and proposing new opportunities for growth and innovation. By recognizing the value of the technical skills within workshops and enhancing the competitiveness of national production, it is possible to contribute to the achievement of the Sustainable Development Goals (SDGs), particularly SDG 5 - Gender Equality and SDG 8 - Decent Work and Economic Growth. In recent years, the field of applied arts and local culture has experienced a significant rediscovery, fueled by a growing ethical and aesthetic

awareness. This has prompted new generations of designers to reconsider their role in response to the changing market conditions (Antonelli, 2012). The contribution analyses the importance of the manufacturing sector in the realm of Made in Italy furniture and accessories, characterized by a high number of companies that occupy the space between industrial and artisanal models (Vercelloni, 2008). However, this situation has contributed to marginalizing small artisans in the arts sector, who struggle to maintain competitiveness due to their size and marketing capabilities. In this context, the paper explores collaborative practices and experiences among universities, businesses, and local organizations, through which young designers have proposed innovative interpretations of the design system. This approach has highlighted hybrid aspects of the discipline, sensitive to territorial peculiarities and not relocatable characteristics (Gambardella, 2020), while simultaneously fostering processes of curation and leadership within a conscious and dynamic interdisciplinary framework.

KEYWORDS | LEADERSHIP, ENTREPRENEURSHIP, MULTIDISCIPLINARITY, MADE IN ITALY, CULTURAL HERITAGE

1. Context and relevance of Local Production: the role of Curatorial Leadership

Local production, particularly that associated with *Made in Italy*, has long been recognized as both a cultural and economic phenomenon of great significance, not only on a national scale but also globally. In an era of ongoing globalization, the challenges associated with sustainability and authenticity have become crucial in the enhancement of local traditions and regional productions. While globalization has broadened opportunities for exchange and growth, it has also raised new concerns regarding the protection of cultural identity and the risk of homogenization of products, leading to a potential loss of uniqueness and distinctiveness. In this context, Italy, with its invaluable heritage of knowledge and craftsmanship, has a unique opportunity to promote an alternative vision of production, one that focuses on quality, authenticity, and ecological responsibility. These values, which have always characterized *Made in Italy*, can serve as a model for sustainable development, capable of addressing contemporary demands without compromising cultural identity or tradition.

Within this framework, curatorial leadership emerges as a strategic response, enabling the connection between the past and the future, between the traditional and the innovative, through careful and mindful management of cultural heritage and local resources. Curatorial leadership functions as a guiding force, preserving the authenticity of craftsmanship and production while steering tradition towards sustainable and innovative practices. This approach becomes crucial in the contemporary landscape, where the challenge lies in aligning the aesthetic and cultural value of products with environmental and social needs.

The concept of leadership, in fact, has increasingly been linked to design, especially in the context of ethical and sustainable design. According to the traditional definition, the term leadership refers to the ability to guide and influence a group towards common objectives (Treccani). However, a deeper analysis, such as that proposed by Peter G. Northouse in his work *Leadership: Theory and Practice* (1997), reveals leadership as a dynamic, interactive, and contextual process, profoundly influenced by cultural, organizational, and social factors. Northouse explores how leadership can be applied in various contexts, including intercultural leadership and team leadership, emphasizing

personal qualities such as intelligence, trust, determination, and integrity, all of which are essential in guiding innovative and collaborative processes.
In parallel, Richard Sennett's *The Craftsman* (2008) plays a crucial role in defining the role of contemporary craftsmanship. Sennett delves into the concept of the "craftsman," focusing on the importance of competence, care, and dedication in manual work, qualities that have traditionally been integral to Italian production practices. Designers and curatorial leaders, therefore, are figures capable of integrating technological innovation with the value of traditions, driving a rethinking of design practices through a greater awareness of their social and ecological implications.
This evolution in design today manifests itself in a reconsideration of the paradigms inherited from the German Bauhaus school, which dominated the design landscape for much of the last century. Today, design culture is increasingly oriented towards a sustainable future, where the overcoming of traditional models is not seen as a threat, but rather as an opportunity to innovate, offering alternative visions that can address environmental, ethical, and social challenges. The growing interdisciplinarity and adoption of hybrid approaches in design highlight the need for a paradigm shift, where sustainability becomes key to integrating artisanal quality with modern market and eco-sustainability demands (Germak, 2015).
Curatorial leadership in design implies a holistic vision that goes beyond the product's aesthetics, considering the social, economic, and environmental impacts of design choices. In this context, design emerges as a fundamental tool not only for aesthetic innovation but also for promoting a responsible business model. As Ezio Manzini (2015) asserts, design is no longer simply a process limited to creating functional and beautiful objects but must respond to the social and ecological needs of a community, generating shared value through practices that are both responsible and inclusive.
In Italy, *Made in Italy* is synonymous with excellence and uniqueness. Its strength lies in the ability to blend tradition and innovation – qualities that are valued through a production system now required to face the challenges of globalization, sustainability, and digitization. Local artisanal practices, combining manual expertise with technological innovation, must now respond to the need for a strategic vision that makes them competitive on a global scale, without sacrificing cultural identity and environmental respect.
In this context, curatorial leadership emerges as one of the most powerful tools for addressing contemporary challenges. This form of leadership not only guides the design process but enriches it with strong cultural and territorial value, bringing to the fore a new type of designer who not only manages but actively curates the relationship between cultural heritage and the innovations needed for the future. Through the enhancement of local resources and artisanal traditions, curatorial leadership enables responses to the growing demand for sustainability and social responsibility, integrating these principles at every stage of the production process.
Within the landscape of Italian businesses, curatorial leadership plays a fundamental role in steering companies toward a more responsible and sustainable business model. Businesses are no longer merely places of production; they are cultural and economic actors that must respond to global challenges, including the demand for products that are ethical, ecological, and people centred. Design, therefore, becomes the engine for a transformation that affects every phase of production, from design to realization, promoting the creation of value that goes beyond the aesthetic and functional aspects of the product. The designer, as a curatorial leader, must integrate creativity, technique, and strategy into a process that meets sustainability requirements without compromising the quality and authenticity that define *Made in Italy*.
This vision aligns perfectly with the United Nations' Sustainable Development Goals (SDGs), particularly SDG 12 (Responsible Production and Consumption) and SDG 8 (Decent Work and Economic Growth). The adoption of ethical and sustainable practices in manufacturing not only contributes to competitiveness but also creates a positive

impact on local communities and the environment, promoting a culture of design that is genuinely transformative.
In light of these reflections, this contribution aims to investigate how curatorial leadership can serve as a strategic design approach to revitalize local production ecosystems in Italy, particularly in the context of hybrid practices that connect artisanal knowledge with contemporary design methods. The research focuses on identifying models of collaboration that integrate cultural heritage, sustainability, and entrepreneurship, highlighting the transformative role of designers as mediators and facilitators of innovation within local communities.
The study adopts an interdisciplinary framework that draws from design theory, cultural studies, and leadership practices. It engages with the work of Northouse (1997) and Manzini (2015), among others, to conceptualize leadership not merely as a managerial function but as a curatorial act – one that balances strategic vision with local specificity and ethical responsibility. This approach also considers the socio-technical dimensions outlined by Sennett (2008), positioning the craftsman not as a nostalgic figure, but as a potential agent of innovation.
Within this framework, the paper analyses design-driven entrepreneurial initiatives developed through the Art Lab partnership – a cross-border cooperation programme supported by Interreg Maritime Italy-France – as a case study to explore how young designers can act as leaders in developing sustainable and inclusive value chains. By examining these initiatives, the research seeks to contribute to ongoing discussions on how design can generate actionable strategies aligned with the SDGs, particularly SDG 8 and SDG 12, while reinforcing the cultural and economic identity of local territories.

2. An Interreg Program Studies the Interconnections Between Design, Leadership, and Local Production

In recent years, Italian design has witnessed a significant expansion in its field of application, embarking on numerous new and uncharted trajectories. Among these, the renewed focus on craftsmanship stands out as particularly noteworthy. This rediscovery and re-evaluation of traditional artisanal expertise, merging historical heritage with contemporary innovation, generates a dialogue capable of redefining the landscape of contemporary design. Far from being a homogeneous phenomenon, this process encompasses a multiplicity of approaches, as documented in publications, projects, and exhibitions. It ultimately contributes to shaping new paradigms for the intersection of design and craftsmanship. Against the backdrop of the legacies left by the masters of Italian design and the generation that has inherited their values, an intricate investigation emerges regarding how craftsmanship has not only been reappraised but also reinterpreted as a virtuous foundation for the future of Made in Italy.
Contemporary cultural production, while not confined to a singular school of thought, demonstrates how design is shaping a parallel reality alongside industrial production. The latter is increasingly marked by an emphasis on authenticity, sustainability, and customization—qualities inherently embedded in the artisanal domain. Through diverse creative strategies, designers not only reinterpret traditional techniques but also integrate them with advanced technologies, proposing production models that respond ethically and innovatively to global challenges. This interplay between design and craftsmanship provides an analytical framework through which the transformation of design practices can be observed, prioritizing sustainability, social responsibility, and technological innovation.
Several significant projects illustrate this symbiotic relationship. Internoitaliano, founded

in 2012 by designer Giulio Iacchetti, exemplifies an innovative approach to contemporary craftsmanship. The initiative envisions a decentralized manufacturing network involving artisanal workshops spread across the Italian territory. By collaborating with these local artisans, the project designs and produces furniture and accessories inspired by Italian cultural heritage. The mission of Internoitaliano is to narrate—through objects—the Italian way of life, which has long been admired and globally recognized. Each product, crafted entirely in Italy, embodies an authentic mode of living, one that is attentive to people, traditions, artisanal skills, and the geographical specificity of materials. A distinctive feature of this project is the signature of each piece: both the artisan and the designer personally sign the finished product, reinforcing the notion of co-authorship and shared creative responsibility.

Similarly, the 2016 DoppiaFirma initiative, promoted by the Fondazione Cologni dei Mestieri d'Arte in collaboration with *Living* – the interior, design, and lifestyle magazine of *Corriere della Sera* – offers another compelling model. Launched during the Fuorisalone of Milan Design Week, the project seeks to enhance the dialogue between contemporary design and traditional craftsmanship, fostering innovative collaborations between designers and master artisans. The resulting works, emerging from this intersection of creative disciplines, serve as tangible expressions of regional identities, demonstrating the capacity of design to revitalize and reinterpret artisanal expertise within a modern framework.

Beyond these initiatives, broader systemic methodologies within contemporary design integrate multidisciplinary knowledge to develop production models that reconcile tradition with technological innovation. The growing constellation of designers engaging with craftsmanship signals a profound shift within Italian design culture, wherein craftsmanship is no longer perceived as a vestige of the past but rather as a dynamic resource for envisioning the future. As Germak (2015) notes, the collaboration between designers and artisans fosters a process of mutual contamination, elevating design quality while establishing new modes of consumption and production. The Italian manufacturing context distinguishes itself by its ability to merge local artisanal traditions and specialized expertise with the opportunities afforded by digital technology. Movements such as the Makers and FabLab, alongside academic and cross-border initiatives, underscore the role of design as a catalyst for innovation and sustainability.

A flagship case study that exemplifies this phenomenon is the Art Lab Net project, promoted by the Department of Architecture and Design (DAD) at the University of Genoa. This initiative integrates the principles of the UN Agenda 2030, fostering regional cooperation and supporting micro-enterprises, often led by female artisans. Through digital platforms and storytelling strategies, Art Lab Net not only enhances the value of artisanal products but also creates meaningful connections between past and future, safeguarding cultural roots while promoting the fusion of tradition and contemporary innovation.

To identify effective strategies for communication and commercial positioning of artisanal products, the research methodology incorporated an in-depth analysis of key projects, field observations, case studies, and expert interviews. Within the Art Lab Net initiative, qualitative interviews were conducted with over a hundred artisans from the Italy-France Maritime regions, exploring their specific needs and expectations concerning the preservation and evolution of their craft. These interviews provided crucial insights into production techniques, daily challenges, and perceived opportunities regarding the integration of new technologies and design strategies. The findings revealed a critical need for mentoring systems that could facilitate the transition towards contemporary market demands without eroding the authenticity of traditional craftsmanship.

An essential outcome of this research was the identification of strategies to enhance the visibility and competitiveness of artisans within an increasingly digitalized and globalized market. Despite their expertise and deep-rooted traditions, many artisans face significant obstacles in adapting to the contemporary commercial landscape, particularly in

effectively communicating the cultural and social value of their products. To address this issue, the study developed a strategic storytelling model, designed to convey not only the intrinsic quality of artisanal pieces but also the rich narratives embedded within them. This approach strengthens the territorial and cultural identity of the products, enhancing their appeal to discerning consumers who seek authenticity and sustainability.
The research further examined emerging market trends, revealing a dual trajectory: while industrial production continues to appeal to cost-conscious consumers, a growing segment of the market actively seeks unique, handcrafted, and ethically produced objects. However, the dominance of mass-produced goods within digital marketplaces poses new challenges, necessitating sophisticated presentation techniques. Augmented reality, 3D modelling, and immersive digital experiences have emerged as viable solutions, allowing consumers to engage more deeply with the materiality and authenticity of artisanal products.
The Art Lab Net project also functioned as a natural laboratory for experimenting with sustainable design solutions. Collaborations between designers and artisans resulted in product prototypes that employed locally sourced and sustainable materials while leveraging advanced technologies to optimize production processes. These efforts exemplify how curatorial leadership extends beyond strategic orientation to encompass an ethical and cultural vision—one that actively steers projects towards responsible business models capable of addressing contemporary global challenges.
The ultimate impact of this strategic mentoring model was the creation of a collaborative framework that granted artisans access to new markets and opportunities while preserving their cultural identity and artisanal values. The role of contemporary designers, acting as facilitators and mentors, proved instrumental in bridging craftsmanship with innovation, ensuring the intergenerational transmission of artisanal knowledge in a manner that is both sustainable and forward-looking. The initiative demonstrated how curatorial leadership can serve as a foundational pillar in supporting local production within an increasingly globalized economy, forging novel connections between past and future while shaping a developmental paradigm grounded in authenticity, ethics, and sustainability.
This trajectory underscores a broader transformation within contemporary Italian design: designers are no longer mere creators of objects but emerge as ethical leaders, actively redefining organizational and production models to align with sustainable and socially responsible imperatives. Their leadership manifests through intercultural design practices, support for design-driven entrepreneurship, and a commitment to fostering ethical consumption models. As Manzini (2015) argues, the designer of the future is a strategic facilitator, capable of synthesizing ethical imperatives with entrepreneurial objectives, thus creating synergies between local and global actors. Within this evolving framework, contemporary design becomes not only a discipline of aesthetic and functional innovation but also a platform for ethical leadership – one that reconfigures sustainability, craftsmanship, and digital innovation into a cohesive and transformative vision for the future.
The methodology adopted in this study is qualitative and exploratory, rooted in design research practices and enriched by interdisciplinary contributions from the fields of cultural studies, economics, and sustainability science. By combining fieldwork, semi-structured interviews, and case analysis, the research provides an in-depth understanding of the dynamics between designers and artisans within local production ecosystems. The insights generated through the Art Lab Net initiative serve not only as empirical evidence but also as a basis for developing scalable strategies that support design-led innovation in local contexts. These findings highlight the relevance of curatorial leadership as a conceptual and practical framework capable of guiding the transformation of local production models in alignment with the UN Sustainable Development Goals. Building on these results, the next chapter will explore how collaborative design processes can be formalized into operational strategies that

strengthen both cultural identity and economic viability, particularly in marginal or underserved territories.

3. From Theory to Practice: Designer-Entrepreneurs rediscover (and improve) Local Crafts

Integrating artisans into the historic centers of lesser-known or smaller villages represents a crucial opportunity to stimulate the development of these areas' tourist appeal. This process not only contributes to the revitalization and valorization of cultural heritage but also promotes sustainability, enhancing the competitiveness of local tourism activities (Sau, 2020). In recent years, there has been a growing "search for authenticity" (Ferrari & Adamo, 2005), which has directed tourist flows toward secondary destinations, largely due to the saturation of traditional tourist hotspots. Despite the challenges posed by the pandemic and economic crises, this phenomenon has led to the rediscovery of lesser-known places, where tradition and craftsmanship can play a vital role in creating more authentic and original tourist offerings.

The "Art Lab" projects, which developed in several phases, are concrete examples of how design can support and innovate the artistic craftsmanship sector, highlighting both its challenges and its potential for growth. The three projects—Art Lab Net, Art Lab Experiences, and Art Lab Services—allowed for a deep dive into the artisanal context, promoting activities that supported the sector in various areas, including sustainability, process innovation, and strengthening networks between designers and artisans.

Thanks to the Interreg Programme, it was possible to encourage a distributed production model across different territories, intertwining design and craftsmanship while enhancing cultural and territorial resources. Particularly noteworthy was the involvement of local associations, which played a fundamental role in promoting artisanal production within their communities. During the Genoa BeDesign Week, for example, a collaboration with the Design District enabled the realization of an exhibition that showcased the work of artisans. Unique and previously unseen products were displayed in the historic centre of the city, allowing many visitors to discover the fascinating knowledge hidden within the workshops. This initiative provided artisans with a direct channel to interact with the public, offering insights into production techniques, engaging in discussions with fellow artisans, and experimenting alongside university design students. Such moments demonstrate how small-scale interventions can foster greater awareness of the artisanal system, laying the groundwork for broader and more structured future projects.

By bringing together students, artisans, and researchers, more conscious and coherent projects can emerge, attuned to contemporary needs while remaining open to future developments. The designer, in this context, asserts himself as "the artist of our time," ready to respond to societal needs by solving problems without stylistic prejudices or artistic pretensions (Munari, 1997). The role of innovation within design can thus be seen as that of an orchestra conductor, capable of weaving connections between different disciplines and charting new horizons that enable the formal recognition and educational codification of the designer-artisan role. Today, the act of thinking is as crucial as the act of making, and meaning surpasses mere physical production of objects, systems, and services (Bassi, 2017).

The Art Lab Net project was the first pivotal step toward synergy among the partners, facilitating the creation of structured collaborations based on each actor's unique skills and expertise. It involved the organization of numerous seminars and workshops, many of which focused on environmental sustainability, aiming to raise artisans' awareness about adopting low-impact materials. Topics such as eco-design, the use of recycled materials for packaging, and the recovery of fabrics for tableware items, all aimed at reducing

ecological impact, were discussed. Additionally, participants had the chance to explore areas such as ethical fashion (in collaboration with Sara Conforti Hòfer), urban gardening (with David Zonta), and restoration techniques (with Antonio Rava and the School of Specialisation in Architectural and Landscape Heritage at the University of Genoa). The historic centres of the cities involved, including Genoa, became a stage for fascinating tours that led visitors through artisan workshops, such as the rickshaw tours organised by Treecycle in Genoa's historic centre.

The second phase of the project, Art Lab Experiences, focused on connecting young graduates in design, art, and architecture with artisanal workshops, fostering the transfer of creative skills into the production context. In this project, young designers proposed innovative solutions such as the use of "non-cruel" silk for jewelers making, the use of natural dyes for textiles, and the adoption of biopolymers for 3D printing jewelers. Beyond creativity, the project also emphasized the importance of roles such as social media managers, marketing experts, and web designers, which can be crucial for enhancing the visibility of artisanal products and increasing competitiveness in the global market.

The third project, Art Lab Services, was particularly significant in addressing the needs of artisans who had recently started their businesses, identifying necessary support services to navigate the challenges of the early stages of professional life. These artisans, often struggling to stabilize their position in the market, benefited from targeted consultations to address transitional moments, where the lack of experience and economic stability can threaten the survival of small enterprises. The program had a significant impact, not only from a technical and operational perspective but also by helping to build a support network that, through an integrated approach to design, marketing, and strategy, fostered the resilience of local businesses.

The results and studies described here are part of the findings obtained from the Art Lab project, supported by the Interreg Maritime Italy-France program, from 2017 to today, in synergy with all the valuable partners of the initiative. It is crucial to acknowledge the contributions of all those involved in the project, without whom this research would not have been possible. If, in the Italian tradition, the entrepreneurial spirit is tied to the "magic of the impossible," linked to an initiatory, symbolic, and alchemical culture (Morace & Lanzone), we must recognize the determination of many individuals. Without a virtuous team effort, the achievements described here would not have been realised. The project team consisted of people from diverse backgrounds, each of whom contributed their expertise and dedication to the initiative. It is therefore important to extend gratitude to all project partners, not only those who worked in the Liguria Region but also the teams from Corsica, Sardinia, and the French Riviera, whose support and insights played a fundamental role in shaping the project's evolution.

Studying contemporary design and cultural trends while participating in initiatives that support craftsmanship has led to key reflections. Italian universities, building upon these newfound insights, have an opportunity to invest further in distributed production models that integrate design and craftsmanship, enhancing cultural and territorial resources without necessarily excluding industry. Academic curricula can incorporate local artisans and foster hybrid experiences, where artisans collaborate with different professionals to develop new educational pathways. By preserving and transmitting traditional techniques to Generation Z, universities can ensure the continuity of artisanal knowledge while adapting it to contemporary technological advancements.

The collaboration among various partners and institutions has laid the foundation for developing synergistic relationships between making, research, and culture. As the world changes rapidly and international dynamics evolve within an increasingly fluid and globalized landscape, the ability to navigate in a different direction becomes an invaluable strength. The fusion of design, craftsmanship, and sustainability within a framework of ethical leadership provides a viable pathway for shaping the future of cultural production, reinforcing the role of artisans and designers as key players in an ever-changing global economy.

These pilot initiatives offer valuable insights into how design-driven innovation can empower local craftsmanship to thrive within contemporary economic and cultural ecosystems. The intersection of tradition and innovation, as demonstrated by the Art Lab projects, outlines a reproducible methodology that can be adapted and scaled in other regions. This approach leverages design not only as a tool for aesthetic or functional improvement, but as a strategic asset for sustainable development, territorial regeneration, and community empowerment.
Ultimately, the rediscovery of craftsmanship through the lens of design and curatorial leadership reaffirms the potential of small-scale, ethically grounded innovation. In a world dominated by globalized production and digital consumption, these practices illuminate a different path – one that values slowness, care, cultural depth, and ecological responsibility.

Figure 1. Detail of sewing work with an electric sewing machine on the worktable of seamstress Gianna Lastrico. She specializes in fabric processing and has a small workshop in the city center of Genoa. Photo credits: Luca Parodi.

Figure 2. Detail of manual lathe work by ceramic artisan Ilaria Traverso. She specializes in ceramic craftsmanship and has an ancient workshop in the historic center of Genoa. She often organizes courses to introduce people to the art of ceramics. Photo credits: Luca Parodi.

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Educating Systemic Design Leadership by conversation

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ABSTRACT | This article examines systemic leadership pedagogy, and the educational evaluation and planning processes designed to guide the developing, adjusting, and teaching of systemic design courses on an international collaborative level.

Contexts: When operating as a systemic designer, systemic design educator, or systemic leader in public and private sectors, one inevitably operates in and with uncertainty due to the exceedingly complexity of the system context that is to be transformed through design, pedagogy, and facilitation. Developing the skills to navigate uncertainty can lead to greater confidence, or certainty, in addressing complex systems holistically. Certainty in systemic leadership then concerns acknowledging the situation that is to be studied as complex and thus connected to uncertainty and the ability to operate in it. To examine this situation, we explored how conversation theory can facilitate discussions and possibly skills in supervising holistic approaches. In particular, we highlight the role of exercising capacities of uncertainty through conversations, demonstrating how structured dialogue can help individuals and teams develop resilience and adaptability in uncertain contexts.

Empirical data gathered from organizing an international course in systemic design within the Erasmus+ program over some years makes a perspective for a theoretical discussion that origins in systemic leadership and pedagogy and on theory on systemic design, conversations, systemic leadership, systems thinking, and pedagogy. In extension we discuss the concept of

systemic leadership and education in relation to UNESCO´s key competences and approaches to teaching necessary to fight the Poly-crisis and the climate change.

KEYWORDS | systemic design pedagogy, conversation theory, Erasmus+ collaboration

1. Introduction

This article emerges out of an Erasmus + collaboration within our network European Systemic Design Lab (ESDL) which is an international collaboration between L'École de design Nantes Atlantique (EDNA), the University of Applied Sciences (HTW) Berlin and the Oslo Metropolitan University (OsloMet) and our interest in reflecting about our pedagogy in relation to theory on systemic leadership and systemic design. This involves the considering of how we lead our own work, how we facilitate for students to lead their own work, how students critically reflect on their own thinking, and how we support students learning to learn- all to be able to operate in complexity and thus uncertainty- and systemic thinking in design.

The overall goal with our Erasmus+ initiative is to contribute to Education for Sustainable Development (ESD) initiated by United Nations Educational, Scientific and Cultural Organization (UNESCO, 2018) aiming to reach the global Sustainable Development Goals (SDG's). Briefly introduced, (ESD) presented eight specific key competencies necessary to fight climate change and the poly-crisis that need implemented in pedagogy and educational planning. The competencies are angled towards action-oriented approaches and transgressive learning in which Lotz-Sisitka et al., (2015) suggests as means to overcome the status quo and prepare the learner for disruptive thinking and the co-creation of new knowledge." (UNESCO 2018) Systems thinking is enumerated first in this list of competencies that can facilitate the change from the status quo.

In our Erasmus+ collaboration, systemic design which can be understood as the combination of design practice and systems theory, is explored in a diverse environment for learning the dynamics and processes this implies, and is thus aligned with UNESCOs understanding of that:
"...to create diverse and cross-boundary learning settings and draw holistic, comprehensive pictures of global sustainability challenges (including the SDGs), educational institutions and educators should foster partnerships at the local, national and international level." (p51, 2018)

2. Methods

Our research is oriented about generating knowledge about status quo in today's educational planning and how this can be transformed by perspectives of systemic leadership and conversation theory.

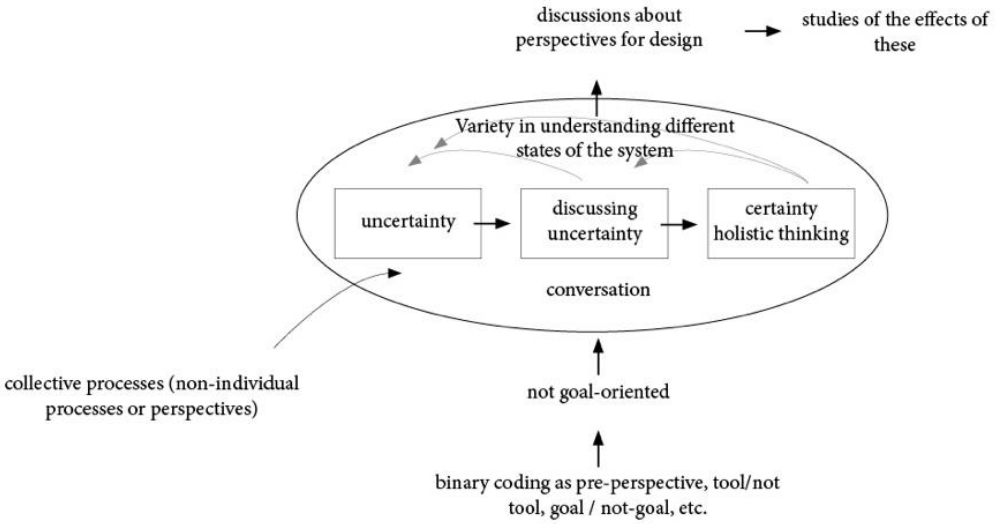

Figure 1. A setup of our research design which describes the status quo by ways of communication and goal oriented processes that do not consider the whole picture for interventions and how collective processes that involve learning to learn by conversation that facilitate students of handling uncertainty and thus the ability to handle and change exceedingly complex systems.

Our examination involves analyzing student feedback from our organizing of education, and experiences with conversation theory as part of this. The theoretical discussion of the case that makes the contexts for examination for this study is oriented about systemic leadership and pedagogy and on theory on systemic design, conversations, systemic leadership, and systems thinking.

2.1 Case, International Weeks

The ESDL collaboration involves, among other things, conducting a joint event that we call International Week, that spans a week, where students from all partaking Universities work with systemic design in cooperation with businesses, public agencies, and researchers. The international week is conducted annually over three years as part of the Erasmus+ program. The case utilized for the theoretical discussion in this article is the International Week. When attending this course, the students have different experiences with systemic design in advance, and their diverse cultural backgrounds and pedagogical experience create a framework for cultural learning and practicing systemic design in a complex international context. In short, the international week in systemic design is structured as follows: students meet, are divided into groups, are presented with a problem from business or research projects, are introduced to a method by a PhD student researching the area, this year's theory was "soft systems methodology" (Checkland & Poulter, 2020), receive guidance from instructors from the three universities, are interviewed and guided by two PhD students working in the field, with a fundamental factor for sharing being based on conversation theory (Glanville, 2007; Pangaro, 2017; Pask, 1978; Sweeting, 2019) and conclude with sharing their results.

During these international weeks the students from these diverse cultural and educational backgrounds work together on systemic design projects confronted with unfamiliar contexts and working with new peers. Due to the coupling of these factors the students meet other perspectives and thus encounter other viewpoints which in turn often elicit critical thinking about personal and

external perspectives. We as educators in this setting seek to create learning environments by adopting *a systemic leadership* role by tutoring students going through these challenges, that involves balancing the demands of the projects, (Robinson et al., 2008) discussions on how reflecting on these issues benefit learning, as well as urging them to always be in the position of seeing the full picture while simultaneously considering the details that make the whole. (Ackoff, 1999; Glanville, 2007; Pask, 1978)

At the end of the international week, students were asked to write about their learning experiences and critically reflect on the pedagogical setup compared to what they were accustomed to. These reflections were utilized as means for discussing how Conversation Theory and systemic leadership can play a role in the attaining of critical thinking at different levels—students, facilitators, and educators—by challenging traditional pedagogical structures and promoting reflective learning beyond comfort zones.

2.2 Systemic leadership

In today's organizational and societal landscapes, leaders and accordingly educators are thus increasingly confronted with complex and interconnected challenges. Issues such as climate change, economic inequality and technological disruptions are not effectively addressed through linear thinking or traditional leadership models – neither in business nor in academic contexts. Authors such as (Beerel, 2020) argue that leadership has to enter into new relationships with nature, society and individuals in order to be able to make a sustainable, trust-based impact on solving problems. The new approach for leadership develops towards an ethical approach as (Beerel, 2020) formulated

> "ethically sensitive managers need to engage in self-examination and develop their own self-awareness. They need to reflect on the kinds of people they are, their value system and the types of decisions they make. They need to be open to self-development and change and should seek out opportunities for personal growth and challenge". (Beehner, 2020)

Also Mugadza et al. (2019) explain how leadership has changed since the Pre-Industrial Age - from the born leader in industrial times towards innovative leadership with a Systemic Design perspective. Leadership in the context of the global poly-crisis is shifting towards a more holistic and adaptive approach, which can be understood as a systemic leadership framework. Systemic leadership integrates principles of systems thinking with leadership practices, a practice that optimally benefit individuals and organizations to learn how to navigate complexity and drive sustainable change. Systemic leadership is rooted in understanding and addressing the dynamic, interconnected nature of complex systems within and beyond organizations. Moving beyond traditional hierarchical models, it emphasizes a holistic perspective that involves collaboration, adaptability- dimensions meant to elicit shared purposes and values such as sustainable transformation. Systemic leadership involves the recognizing of organizations as components of broader, complex systems. This requires leaders to connect people and resources across these interdependent networks. (Beehner, 2020, p. 2) Senge et al. (Senge et al., 2019) identify three defining features of systemic leadership:

- "Systemic leaders are not extraordinary individuals but facilitators who create the conditions for effective social change.
- Leadership in this context is not limited to formal authority; any individual within an organization can act as a systemic leader.

- Key systemic leadership capabilities include the ability to view the larger system, encourage reflective and innovative dialogue and shift the collective focus from reactive problem-solving to proactive co-creation of the future." (Senge et al., 2019)

Systemic leaders perceive polarized situations and seemingly wicked challenges as opportunities for innovation (Senge et al., 2019) They are adept at balancing short-term reactive problem-solving with long-term, proactive value creation. Their commitment to the overall well-being of the system may fosters transparency, openness and alignment within teams and organizations (Beerel, 2020; Brown & Treviño, 2006). A fundamental strength of systemic leaders lies in their ability to build collaborative networks. This practice promotes transparent communication to cultivate an environment where innovative solutions can emerge. Moreover, systemic leaders embrace the unknown, asking exploratory questions and demonstrating a dedication to continuous learning, which inspires broader change efforts. (Senge et al., 2019) Brown & Treviño, (2006) highlight the importance of adopting a more structured and integrated social scientific approach to understanding leadership as it is practiced in real-world business contexts. Drawing on social learning theory, they explore the influence leaders have on the behaviors and perceptions of those they engage with. Social learning theory suggests that individuals are inclined to observe and imitate role models they perceive as credible and appealing. Based on this framework, Brown and Trevino define ethical leadership as

> "the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement and decision-making." (Brown & Treviño, 2006)

In university contexts, ethical leadership might be relevant, as professors often serve as role models whose actions and communication might influence students' learning and ethical development.

In this research however we consider systemic leadership a complex functioning that involves understanding communication as cyclic. (Bateson, 2000) Cyclic communication involves the conception of feedback, a primary term of cybernetics, that can be explained as when observed outcomes of a system's action is taken as input for further action (Sweeting, 2015). Cybernetics thus, involves the examination of how systems outputs, change the actions, that again change the outputs, in circuits. Cyclic communication thus, when described can help understand the different logical levels of communication that happens in a system. (Meadows & Wright, 2015) When discussing or conversing however it is difficult to get an overview throughout these levels of communication. Hence, the complexity of the communication represents a context of uncertainty in which the systemic leader, the systemic designer, or service designer must operate.

2.3 Certainty and uncertainty

Systemic design approaches are exceedingly complex situations and builds on the concept of richness of data and the visualization of these, cooperative processes, openness to exploration, and thus uncertainty as basis for practical application of methods.

Certainty in systems theory and learning can be linked to the question of how do you know that you know? (Coombs, 1987; Maturana, 1988) or how do you know what you know? Certainty from a teacher's perspective is often connected to instructional pedagogics as well as to autonomous oriented or problem-based pedagogics. In both situations one could say that the professor meta-communicates "I know this therefore I can instruct" or "I know this therefore I can let you come to a conclusion that I can evaluate". However, understanding these two situations in relation to critical thinking can somewhat help disconnect the pedagogics from the understanding of knowing and not knowing. For students approaching exceedingly complex situations with certainty may involve

changing the situation by design interventions with confidence, that they do not know the effect of, even though the teleological perspective. Uncertainty, however, may represent the ability to operate in such situations without initially understanding them nor methods for how to handle them. However, with skills and knowledge about *how* to gain understanding one may generate insights that will lead to the emergence of how to approach the complexity and thus increased possibilities to analyze the effects of suggested interventions towards change. The same can be said for the educational planning. To be uncertain and trying to understand uncertainty and complexity can thus be understood as a systemic skill both on educational level and practitioner level that may be described as learning to learn.

2.1 Conversation theory and learning to learn

We are therefore studying how conversations work in a pedagogical setting and how they may facilitate processes of concentration, thinking of various perspectives for understanding, thinking on the basis of the thoughts of others. That is, practicing on being critical towards personal and external critical thinking.

Conversation theory, as described by Pask (1978) involves a situation that sets the "stage for shared language" based on "interactions that may build … [sufficiently] shared understanding … that may lead to … action or (trans)action—a coordinated interaction in domains other than language" (Pangaro, 2017). Reactions, in this view, refer to a priori knowledge, while communication that builds on other communication refers to relations that create a continuing whole. Conversation theory grew out of the early development of cybernetics. Gordon Pask, a pioneer in the field, described in the mid 1970's the Conversation theory, which is referred to by Paul Pangaro (2017), with the words of Pask: "Conversations are the things we study", and such they facilitate "learning to learn. (Pask in: Pangaro, 2017) In a conversation a student or teacher or others, build on or utilize communication to create the subsequent communication. Counter to what typically happens in a dialog or two way communication, where people react to a statement based on existing personal meanings or knowledge, conversations thus build on communication to create new meanings and knowledge (Pangaro, 2017; Pask, 1978; Scott, 2015; Sweeting, 2015, 2019).

A conversation can be organized by the framing of that an individual utters something, the next person will build on this thought by adding something to it, taking it into a new sphere or paradigm, and so forth. The uttering of the second individual is thus externally initiated by the first. The third individual builds on the argumentation of the second with the first in mind. That is as the utterings build on each other and the conversation will respectively and gradually distance the discussion from prior thinking by the partaking individuals and create new thinking. The conversation itself thus starts with the thinking of others and creates the examination of uncertainty with and without the support of theory or practice. It is an interesting distinction between communication and conversations, and that is:

> " that for conversation to have occurred, something must have changed for one or more of the participants – understandings, concepts, intent, values. That is, something has evolved. Otherwise, it is merely the exchange of messages (Pask (1981) in: Pangaro, 2017)

The concept of conversation is not far from how Schön (1995) later described how practitioners reflects in their work processes and how for example a change in a conversation performed drawing in design changes the conversation, which in turn changes the drawing—a process that subsequently has a direct influence on the properties of something other than the conversation, such as a service or product.

Conversation theory then expands the complexity of a situation, by individuals studying the effect of change, being forced to take the standpoint of- or build on arguments that might be in conflict with personal thoughts or values, and allows for the remaining in uncertainty by the certainty of the frame or rules for the activity.

3. Exercising capacities of uncertainty by conversations

Examining the educational planning in the context of systemic leadership and conversation theory we discuss how the context of the international week can influence the ability to think critically about one's own learning, and how this teaching format has pushed levels of pedagogy in systemic design education. Practice of methods and learning processes at one university might not immerse automatically into another cultural environment. One institution might be focused more on methodology and frameworks, some on reflections and learning, and others might prioritize creativity and holistic reflections. International week as a project is designed to question these practices and give ideas on new implementations for systemic design leaders on several levels. The systemic reflections about study environments happen for systemic design leaders, while different kinds of personal reflections on learning, as an impact of experiencing the event, happen at the level of students.

Feedback from the students' individual reflection notes after experiencing the international week outlined that the local environment for learning creates different viewpoints on how to handle the assignment. Different institutions have diverse viewpoints on how the event should be organized and what are the expectations of outcomes for students. This is mainly due to the distinction between cultural backgrounds of each university and their local approach to teaching. Throughout the process of facilitation, their viewpoints are shared and discussed. Levels of involvement, and the choice of stakeholders depend on the hosting university and the organization team, but the overall goal of the international week, contents and process to a certain extent involves contribution of each university. This way, the ability of each university to reflect on their local practice is initiated already in the organization phase. There might be various depths in which teachers, or also leaders, evaluate their own environment.

What was specific for the international week in Oslo in 2024, is the encouragement of students to focus on the learning process, reflections and discussions, rather than the deliveries at the end of the week. This has created different kinds of dynamics, where their personal space, and how the whole groups of students were collectively processing this learning, was uplifted from the end result. Another approach was to teach a method through encouraging students to experience, reflect on and handle the uncertainty of the studied context. For example, the emphasis was placed on the exploration of the applied method, and it’s possible modification, or a reflection on groups' understanding of how the method works. Due to this framework, the practice of what students are used to from their traditional program was challenged at the same time, as well as the approach on how to teach a certain method, or how each leader perceives the method.

Teaching to operate, stay and work with uncertainty could be a relevant practice for future systemic designers. Several students in their individual reflection notes mentioned that this experience was uncomfortable, and some found it very explorative and exciting. This is the example where the practice they are used to might play a role in the facilitation of their learning process.

One of the first traces of reflection for students starts when they enter a different environment. In autumn 2024 the event of international week was held at the Kjeller campus of Oslo Metropolitan University, where the lectures, discussions, teamwork and tutoring took place. The university plays an

important role on the flow of the event, and on the facilitation, such as if students have access to food, good working space, and technology. Hosting universities have a great influence on how the students operate, often challenging their learning process, in what way their project thinking is developed, and their capabilities to work in teams. This environment also determines the way students perceive their leaders and the kind of communication settings they are used to. They also experienced how leaders discuss their viewpoints on methodology. For some students it was perhaps natural to see their leaders involved in conversation about methodology, while some were somewhat surprised by the fact that this is even possible. That is, the thought of that leaders can develop thinking by conversing in front of students which represents uncertainty by the leaders to some students and staff and a certainty of being able to learn by discussions for others.

What students perhaps often do not realize, but what was obvious from the setting of the week, was that students are often not aware that their own practice and learning process can teach their own leaders. International week can likely be giving them space to do so. It would be interesting to see the dynamics of the international week, if students would be aware of this fact from the beginning. This, as a result, brings dimensions to the pedagogical setting, where teaching systemic design requires openness to different views on theory, methods and context to be examined. Systemic leadership perhaps involves conversing leaders who can develop thinking in front of students.

3.1 Organizing uncertainty by international meetups

The systemic leadership processes implemented during the international week produced reactions from the students who described the leadership roles as uncertain, unknowledgeable, disorganized and unfocused i.a. Specifically, students appeared to struggle with the transition from the teaching processes they were accustomed towards collaborative and participatory dynamics of teaching and learning with a systemic leadership mindset. This understanding was proven in the student's feedback evaluation, where they expressed a preference or expectation for more conventional approaches to teaching and leadership. Such feedback suggests a gap between the intended goals of systemic leadership in teaching and the students' existing perceptions of what effective leadership and teaching should look like. It seems thus that the educational planning could have included information about- or tasks in which the students could consider collaborative learning contexts and critical thinking as a first step of the project. Bridging this gap may give the students the potential of becoming certain in the context of uncertainty of systemic design approaches and processes.

The different learning traditions that the students and teachers convey from their respective educations, will be, at some point, confronted with a way of working that they are not used to. Hence, the international meetups blend traditions on student and teacher levels and the *potential of uncertainty* emerges. Accordingly, all partakers have to question their doxa, that is, the deeply engraved learning, perspectives, or established paradigms that are expressed and unexpressed. This could for example involve discussing different approaches and will or coping to persist uncertainty involving levels of synthesizing work to create an outcome and framing what an outcome means.

Furthermore, it can involve questioning different levels of hierarchy, guidelines and objectives or instructions in relation to learning and thus the consideration of how a leadership model allows for student and teacher agency.

Systemic leadership perhaps as mentioned above may involve conversing leaders who can develop thinking by such questioning by conversation in front of students. Such thinking may involve conversing about other ends of the doxas as in the above examples. In this setting where the students

take part in the conversation agency may emerge for all partakers learning to learn on different levels. These considerations represent similar functions of what Senge describes as systemic leadership. If the international meetups produce all these investigations of doxas, the teachers are no longer extraordinary individuals but perhaps facilitators for exactly providing the discussions of them. As the teachers take part in the discussions close to the role of the student, leadership is shared with the student and no longer limited to a formal authority. Another way to understand this is that the conception of performance, knowledge, insight, and learning is contextualized by uncertainty and made possible by conversation theory in a diverse group.

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ethical leadership
a new frontier for design

Integrating Digital Technology with Traditional Craftsmanship: Sustainable Clothing Design Inspired by Song Brocade Patterns

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1 Abstract

This study focuses on **Song Brocade**, a significant representative of China's intangible cultural heritage, and explores how **interdisciplinary design methods** can be employed to digitally transform its intricate patterns. By applying **Shape Grammar** rules, the basic forms of the patterns are analyzed, and artificial intelligence-generated content (**AIGC**) is integrated to optimize the evolution of the designs, which is ultimately applied to fashion design practice. The aim of this research is to **promote the sustainable development of cultural heritage in the modern context**. Furthermore, this study addresses the ethical challenges posed by technological advancements in the digital era, particularly how designers can balance aesthetics, cultural preservation, and social responsibility, while exercising ethical leadership to ensure that their designs have a positive societal impact. Ultimately, this research proposes a sustainable fashion design approach that **combines technological development with ethical leadership**, contributing to the protection of intangible cultural heritage and the harmonious integration of tradition and modernity, with significant cultural and social value.

2 Research objectives

1. Digitization of Song brocade patterns using interdisciplinary design methodology, shape grammar and AIGC technology for garment design practice.
2. Assess the contribution of digital transformation to cultural heritage protection and sustainability.
3. Explore ethical challenges in the digital era, focusing on how designers can balance aesthetics, cultural preservation, and social responsibility.
4. Propose a sustainable fashion design approach that integrates digital technologies and ethical leadership, fostering the integration of tradition and modern design.

3 Research process

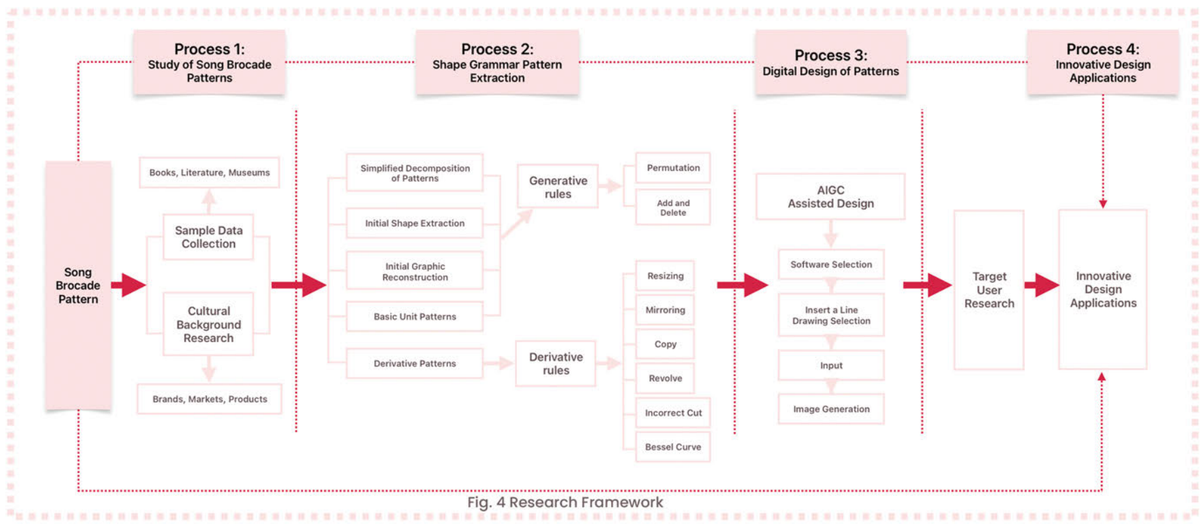

Fig. 4 Research Framework

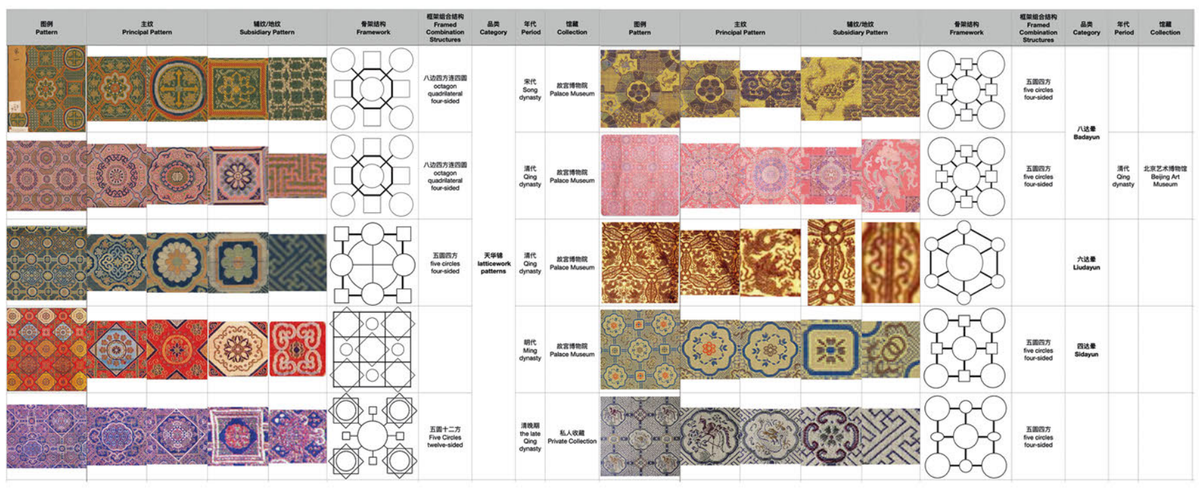

Fig. 1 Research on Representative Patterns of Song Brocade

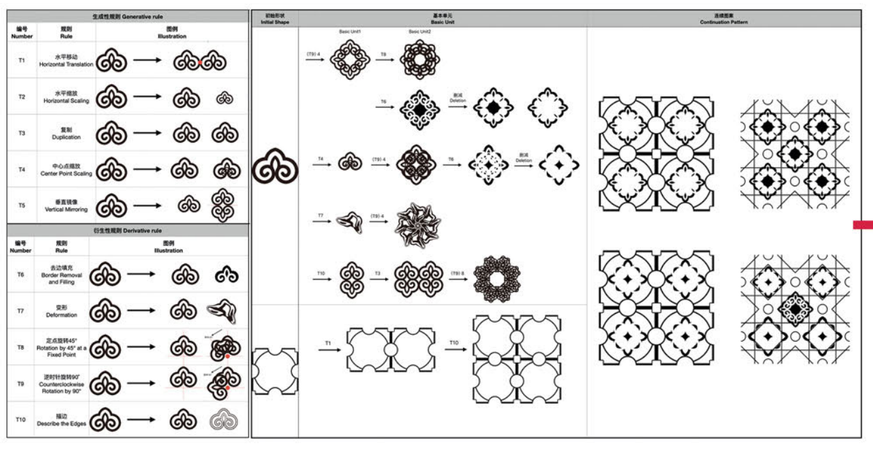

Fig. 2 Shape Grammar Pattern Evolution Process

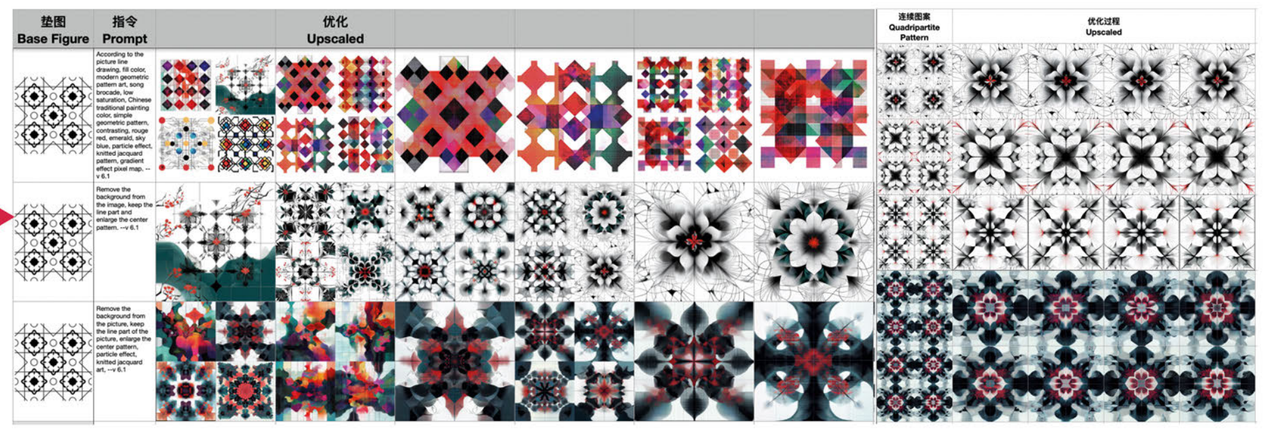

Fig. 3 AIGC Technology Aids in the Contemporary Transformation of Song Brocade Patterns

1. **Shape Grammar Analysis:**
   - The study begins by analyzing Song Brocade patterns using Shape Grammar, which systematically extracts the core geometric principles from the traditional designs.
   - Shape Grammar enables the design process to identify and replicate key motifs, structures, and transformations found in the patterns, establishing a clear and rule-based framework for further innovation.
2. **AIGC Optimization:**
   - Midjourney, an AIGC tool, is used to optimize and evolve the analyzed Song Brocade patterns.
   - The patterns are translated into a "skeleton structure" that serves as the base for AI-driven optimization. The skeleton structure retains the core geometry and cultural essence, while AIGC generates refined patterns that fit contemporary fashion requirements.
   - This method allows the incorporation of modern design trends while maintaining traditional aesthetics.
3. **Cultural Heritage Preservation:**
   - The study investigates how digital tools such as Shape Grammar and AIGC can ensure that Song Brocade patterns are preserved for future generations.
   - The integration of these technologies aids in safeguarding the intricate patterns of Song Brocade from being lost to time, while adapting them for new uses in fashion and design.
4. **Ethical Leadership in Design:**
   - Ethical challenges in digital design are addressed, with a focus on ensuring that the use of AI and digital tools does not compromise cultural authenticity.
   - The study advocates for designers to lead with social responsibility, creating fashion designs that balance innovation with cultural preservation.
5. **Fashion Design Application:**
   - The final stage of the process involves applying the optimized patterns to garment design, blending traditional Song Brocade with modern fashion sensibilities.
   - This application demonstrates how digital technologies can bridge the gap between cultural heritage and contemporary fashion trends.

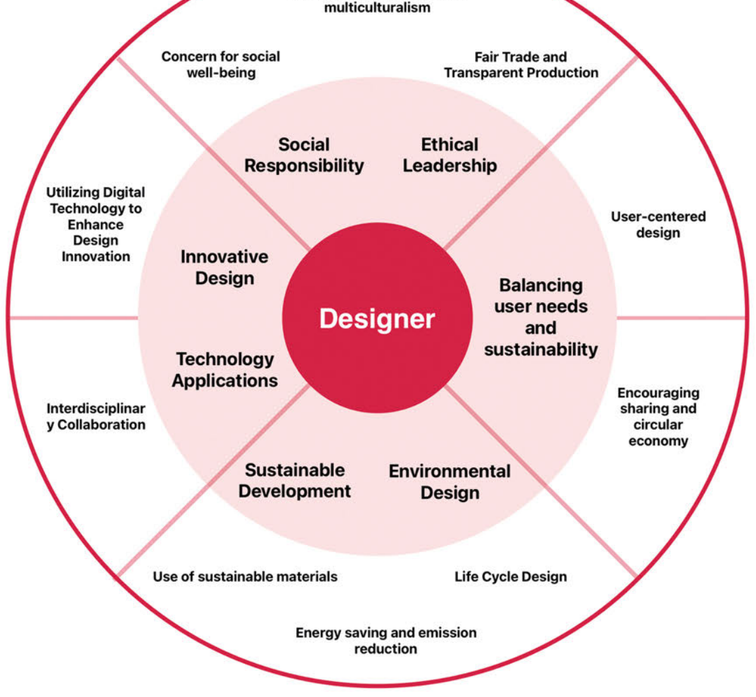

Fig. 5 Ethical Leadership for Designers

4 Contributions

1. **Cultural Heritage Preservation:** Demonstrates how digital tools like Shape Grammar and AIGC contribute to the long-term protection and sustainability of Song Brocade, preserving an important aspect of Chinese cultural heritage.
2. **Fusion of Technology and Tradition:** Highlights how traditional design elements can be successfully merged with modern digital technologies, showcasing a new approach to fashion design that respects both tradition and innovation.
3. **Ethical Leadership in Fashion Design:** Proposes a framework for integrating ethical considerations in the use of digital technologies, ensuring that designers lead with social responsibility and cultural sensitivity.
4. **Sustainable Fashion Design:** Provides a new pathway for sustainable fashion design by combining traditional craftsmanship with cutting-edge digital technologies, promoting both ecological and cultural sustainability.

5 Conclusion

This research not only contributes to the sustainable protection of cultural heritage but also provides a framework for the fashion industry to merge tradition and modernity responsibly. The integration of digital technologies with ethical leadership leads to the creation of culturally inclusive and socially responsible designs, offering long-term cultural and societal benefits.

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From Designers to Leaders
Cultivating Ethical Leadership by Design-Driven Entrepreneurship

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Narrative Metaphor and Cultural Embedding: Constructing Cross-Cultural Co-Creation Paths through Journey to the West

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01 Abstract

In the context of globalization, designers are increasingly becoming ethical coordinators in intercultural networks, striking a balance between national characteristics (collective values) and self-patterns (individual cultural interpretations). Taking Journey to the West as a cultural prototype, this study introduces an ethically-driven cross-cultural collaborative creative design method. By deconstructing its narrative metaphor, we extract the essential behavior pattern of Chinese society and construct a framework of national character. Establish a participatory ethical consultation mechanism to engage designers, users, businesses, and AI actors in a multi-dimensional cultural dialogue. The virtual scene theater is created in the form of cooperative card model, and the game income between different characters in different scenes is calculated to determine the optimal design strategy.

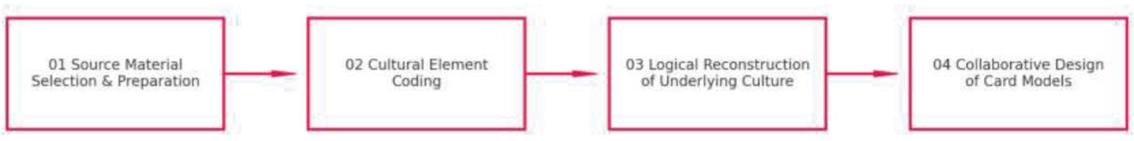
Keywords: Cross-cultural co-creation; Ethical negotiation; National character; Cultural respect; Algorithmic transparency

02 Research objectives

 # Objective:
Develop an ethical mediation framework for cross-cultural design, harmonizing national character (collective values) and self-schema (individual interpretations).

 # Core Issues:
Mapping collective behaviors via cultural archetype deconstruction;
Multi-agent ethical negotiations (designers/users/AI);
Stereotype reduction through algorithmic transparency & cultural traceability.

03 Research process



01 Cultural archetype deconstruction

Source material selection and preparation

#We analyzed Journey to the West and 20 multimedia adaptations (1950-2025), establishing a structured framework. Through text/video analysis, 162 concepts emerged, categorized by these criteria:

Observation Dimension	Specific Indicators	Recording Example
Physical Characteristics	Material/Morphology/Sound Effect	Metal ring-shaped/Engraved with Sanskrit
Usage Context	Trigger/Object/Temporal and Spatial Location	Tang Seng recites the spell during the pilgrimage to obtain scriptures
Functional Performance	Physical Reaction/Psychological Change/Relationship Evolution	Headache → Behavioral restraint → Integration among the master and disciples

Cultural element coding

We conduct a deep disaggregation at the sentence level of the original Journey to the West in the 14th "Heart-ape Correction".

"三藏却才信真...把那针儿幌一幌，碗来粗细..."

It is defined as a metal ring of variable size from the physical form, and exists as a prop with a specific function; At the same time, sorting out the conferring ceremony presents a clear power transfer chain of Guanyin → Tang Monk → Wukong, which lays a micro foundation for subsequent analysis.

Comparative analysis of the film Journey to the West: Conquering Demons and the original work reveals differences in cultural interpretation across media through key dimensions.

Contrast dimension	Original presentation	Film and television adaptation
Wearing process	Deceptive wearing	Voluntary acceptance
Pain presentation	Simple physical pain	Flashback with memory (Flower and Fruit Mountain scene)
Discharge method	It disappears automatically after becoming a Buddha	Emotional resonance trigger failure

#Based on the results of micro-deconstruction and cross-media comparison, conceptualization was carried out to generate the initial concept matrix (part of which is shown below).

Observation phenomenon	Abstract dimension	Initial concept	Theoretical annotation
The secret language is taught when Guan Yin gives the ring	Concealment of power	Implicit discipline	Foucault's Discipline and Punishment
Wukong obeyed the precepts independently in his later years	Subjectivity construction	Cognitive internalization	Bandura's social cognitive theory
The hesitation of the Tang monk when he recited the mantra	Power legitimacy anxiety	Authority vulnerability	Giddens' modernity theory

To ensure accuracy and reliability, this study uses triangulation to verify concepts from multiple perspectives, and then constructs a concept evolution map.

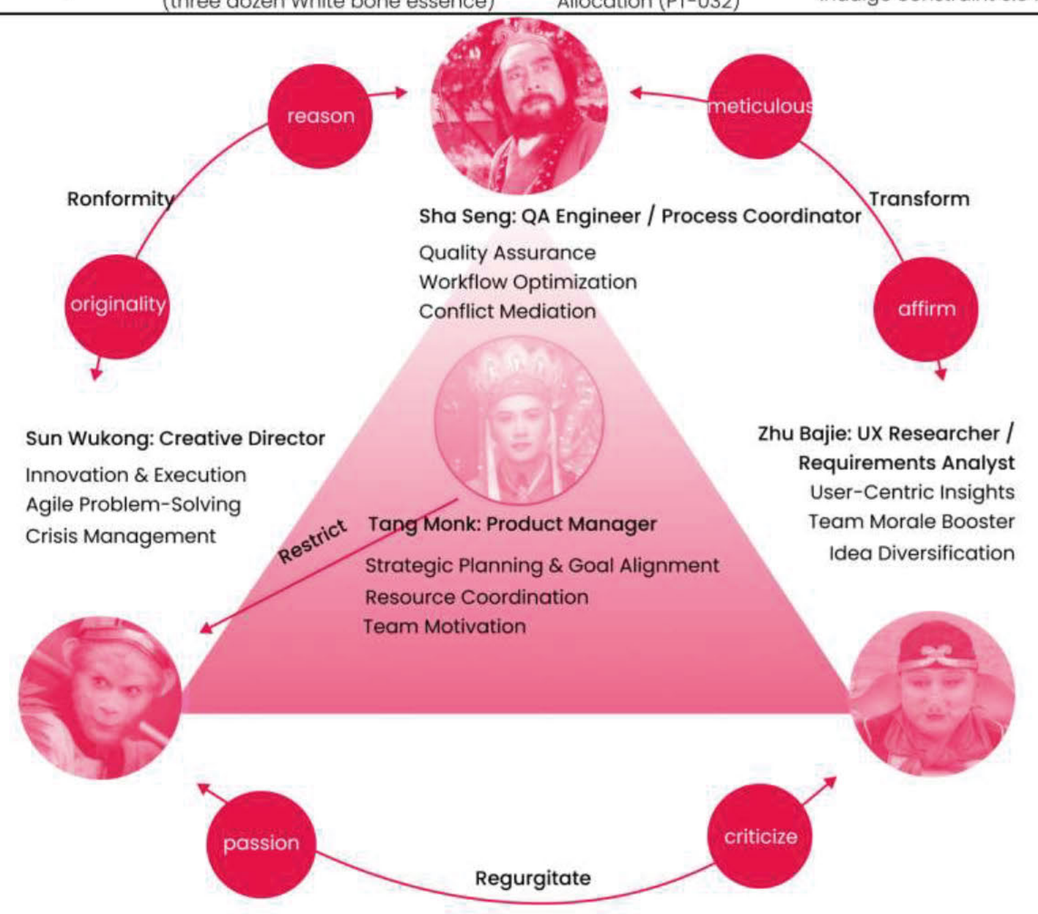
A[Original image: Metal headband]	B1(Religious Instruments)
A	B2(Instruments of Torture)
B1	C1(Practice symbol)
B2	C2(Power Device)
C1	D1(Rule Internalization)
C2	D2(Discipline Technology)

We used the Delphi Method with 6 experts from various fields to rank and weight 162 initial concepts.
Provide experts with the initial concept matrix and theoretical notes generated by qualitative analysis, Experts were asked to give 1-5 ratings on five dimensions: applicability of cross-cultural design (weight 30%), cultural universality (weight 25%), potential for ethical coordination (weight 20%), user perception intensity (weight 15%), and narrative plasticity (weight 10%).

02 Scene dramatization experiment

Logical reconstruction of the underlying culture

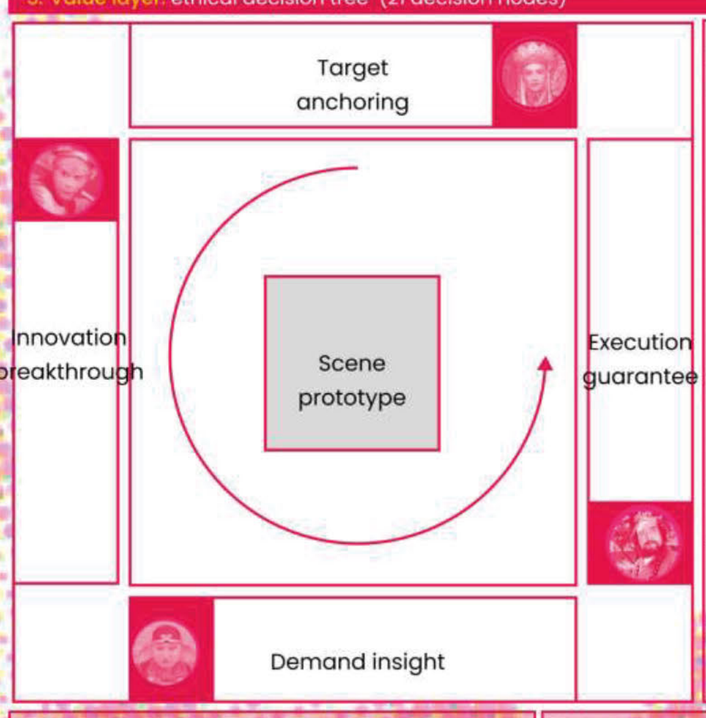
dimensionality	subcategory	Sample example	Cultural parameter
Role symbol	Breakthrough type (Sun Wukong)	Straitjacket - Discipline Mechanism (GZ-008)	Power distance 0.82
Artifact symbol	Regulatory Tools (Customs Documents)	Golden Cudgel - Innovation Breakthrough (JG-015)	Uncertainty avoidance 0.67
Spatial symbol	Test Scene (Flaming Mountain)	Liusha River - Team Run-in (LS-023)	Long-term orientation 0.78
Behavior symbol	Ethical conflict (three dozen White bone essence)	Flat Peach Banquet - Resource Allocation (PT-032)	Indulge constraint 0.54



Collaborative design of card models

Cultural gene decoding (feature library) → Conflict scenario inference (theater) → Ethical path selection (decision tree) → Strategy utility verification (game matrix)

1. Symbol layer: "Journey to the West" element feature database (162 mark samples have been included)
2. Behavior layer: Situational simulation theater based on cards (48 subdivided scenes in 4 categories)
3. Value layer: ethical decision tree (21 decision nodes)



Four Core Conflict Types

Ethical Hierarchy (12 scenarios)
Bajie's Feast: Team Trust Crisis
Key: Collectivism vs Self-Interest

Regulation-Innovation (12 scenarios)
Golden Cudgel: Code Compliance Debate
Goal: Innovation vs Regulation Balance

Identity Authentication (12 scenarios)
Twin Monkeys: IP Ownership
Solution: Blockchain + DNA Auth

Resource Ethics (12 scenarios)
Alms Distribution: Design Ethics
Model: Maslow × Circular Economy

Ethical decision tree system
Three-level judgment system

Examination of cultural legitimacy: Hofstede's six-dimensional assessment
Technical feasibility verification: TRIZ contradiction matrix analysis
Value consensus: Delphi - Game hybrid algorithm

Four-element game model
Construct a Nash equilibrium oriented return matrix:

strategy mix	cultural adaptation benefit	innovation benefit	sustainable benefit	comprehensive utility
Regulation + innovation				
Demand + execution				
Collaborative innovation				

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NAVIGATING ETHICS IN A CULTURAL EXHIBITION: BIODESIGN MEETS TRADITION

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DESCRIPTION | The exhibition "Objects that Grow on Trees: The Amazonian Cuias and Biodesign" opened in Lisbon in October 2024 as part of a practice-based Design PhD project. Preparations for the exhibition began a year earlier with the aim of presenting contemporary Biodesign experiments alongside the traditional craft of Cuias de Santarém—a type of container produced by riverine craftswomen in the Brazilian Amazon.

The exhibition drew a parallel between the traditional craftsmanship of Amazonian cuias and Biodesign, an emerging design approach that involves collaboration with living organisms. This connection offered a powerful opportunity to highlight ecological approaches in design, innovation, and cultural heritage. However, the convergence of these distinct realms also raised important ethical concerns. Careful consideration was necessary to prevent the exploitation, misrepresentation, or harm to the communities whose knowledge and contributions were central to the exhibition. Furthermore, it was essential to acknowledge the ecological and cultural significance of the *Crescentia cujete* (commonly known as the Cuieira tree), underscoring the role of non-human actors in both Biodesign and the traditional craft processes involving cuias.

Ethical Considerations
The exhibition adhered to the following ethical principles:

1. Informed Consent: Securing consent from artisans to research their techniques as part of the PhD studies.
2. Research Registration: Registering the study with the Brazilian Research System

SisGen, in compliance with regulations.
3. Review of Relevant References: Studying references related to other exhibitions on topics such as the Global South, decolonial approaches, and the acknowledgment of non-human agency.
4. In-Person Consultation: Engaging artisans in direct consultations regarding the exhibition.
5. Artisan Commissioning: Commissioning craftswomen to create specific works for the exhibition.
6. Contextual Representation: Ensuring accurate and respectful representation of the craftswomen and the Cuieira tree.
7. Profit Redistribution: Selling artisanal works after the exhibition and redirecting profits back to the artisans.

Central to this process was ensuring the craftswomen's voices were authentically represented; they were engaged in conversations around their participation and collaboration. As a result, the exhibition was richly contextualized, showcasing not only the artisans' territory and craft processes but also featuring a video with interviews of the artisans themselves. Traditional cuias crafted exclusively by the artisans for the show were curated in collaboration with them, and these works were made available for purchase after the exhibition.

Exhibition Content
In addition to traditional cuias, their history and fabrication processes, the exhibition presented experimental Biodesign objects developed as part of the Cuia Colab project (see Bandoni et al., 2023, 2024; Falco et al., 2024). This project investigates diverse possibilities of biofabrication using cuias. The exhibition emphasized the differences between industrial design and working with living organisms, highlighting a slower process, non-uniform results, and a deeper connection with the territory and the Cuieira trees, proposing new perspectives in the design field.

Broader Impacts
The exhibition "Objects that Grow on Trees" not only demonstrated the ethical potential of integrating biodesign with ancestral knowledge, but also fostered meaningful engagement with the artisan community. By providing financial benefits to the artisans and highlighting their cultural contributions, the exhibition serves as a potential model for bridging scientific and traditional knowledge in the context of design.

Images and links related to the exhibition in the following section.

KEYWORDS | EXHIBITION, BIODESIGN, AMAZON FOREST, TRADITIONAL KNOWLEDGE, DECOLONIALISM

Images

Figure 1. Overall view of the exhibition “Objects that Grow on Trees: The Amazonian Cuias ans Biodesign” at the Gallery of the fine-Arts Faculty of Lisbon University in October 2024. Source: Author, 2024.

Figure 2. Detail showing a display of the traditional cuias made and chosen by the Amazonian crafstwomen especially for the exhibition in Lisbon. Source: Author, 2024.

Figure 3. One of the sections of the exhibition focused on the history of cuias and its making process. Visitors were allowed to interact with cuias and other materials. Source: Author, 2024.

Figure 4. To better situate cuias´ production, the territory was represented in 3 maps: the Latin-American map shows where cuieira trees are mostly present (Moreira, 2017), a regional map shows the Amazonian riverine context, and a local map represents the community region, where cuias craftswomen live and work. Source: Author, 2024.

Figure 5. Section of the exhibition that focused on the *Crescentia cujete* tree and the relationship between humans and plants, mentioning the theme of co-designing with nature. Source: Author, 2024.

Figure 6. Biodesign prototypes were shown alongside photos of their growth process in molds attached to the Cuieira tree. Some of the molded cuias were finished by the traditional artisans, who gave the objects a layer of black lacquer. Source: Author, 2024.

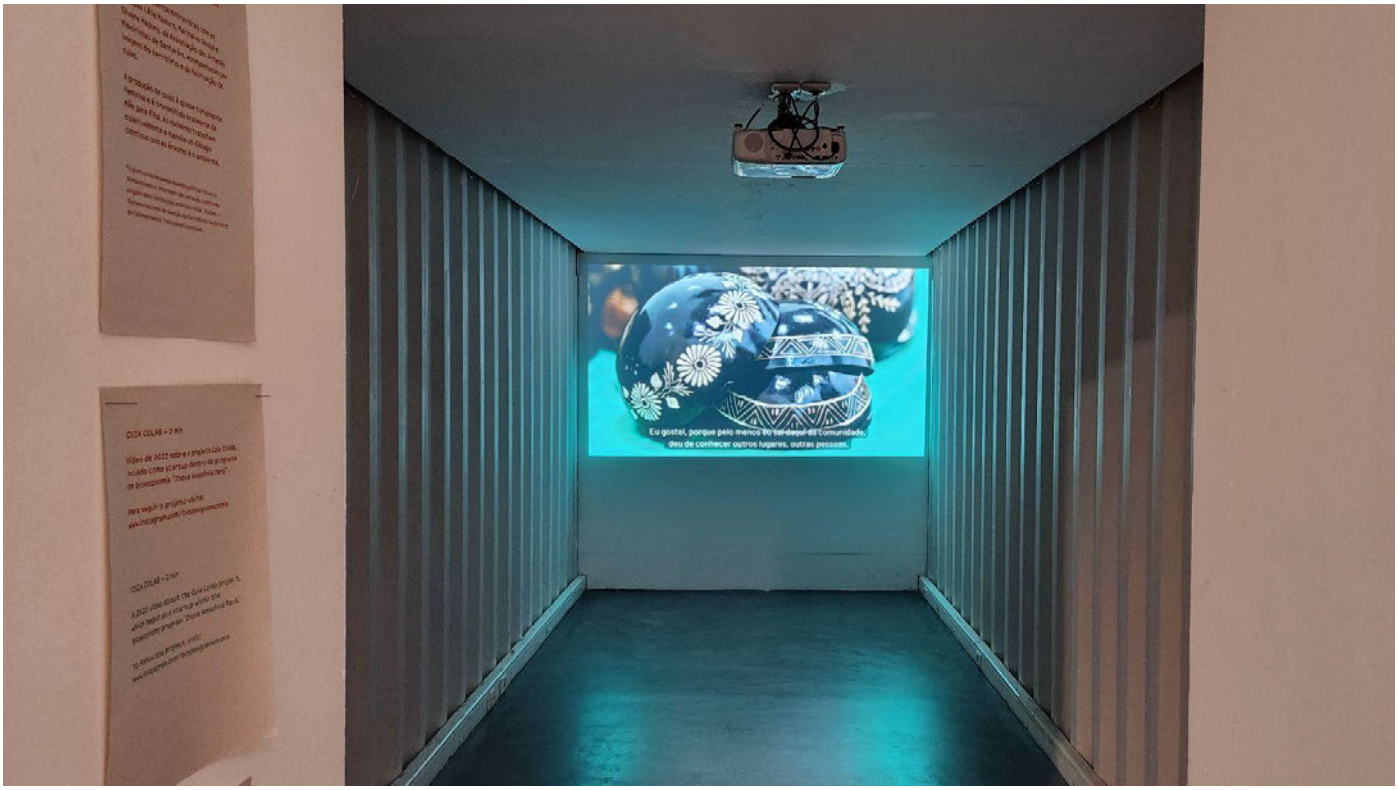

Figure 7. The video room, where 2 videos were displayed: “Cuia Colab” aimed at explaining the Biodesign project in details and “7 questions to cuia artisans” brought the artisan´s voices to the exhibition by showing an interview with the woman and images of their context. Source: Author, 2024.

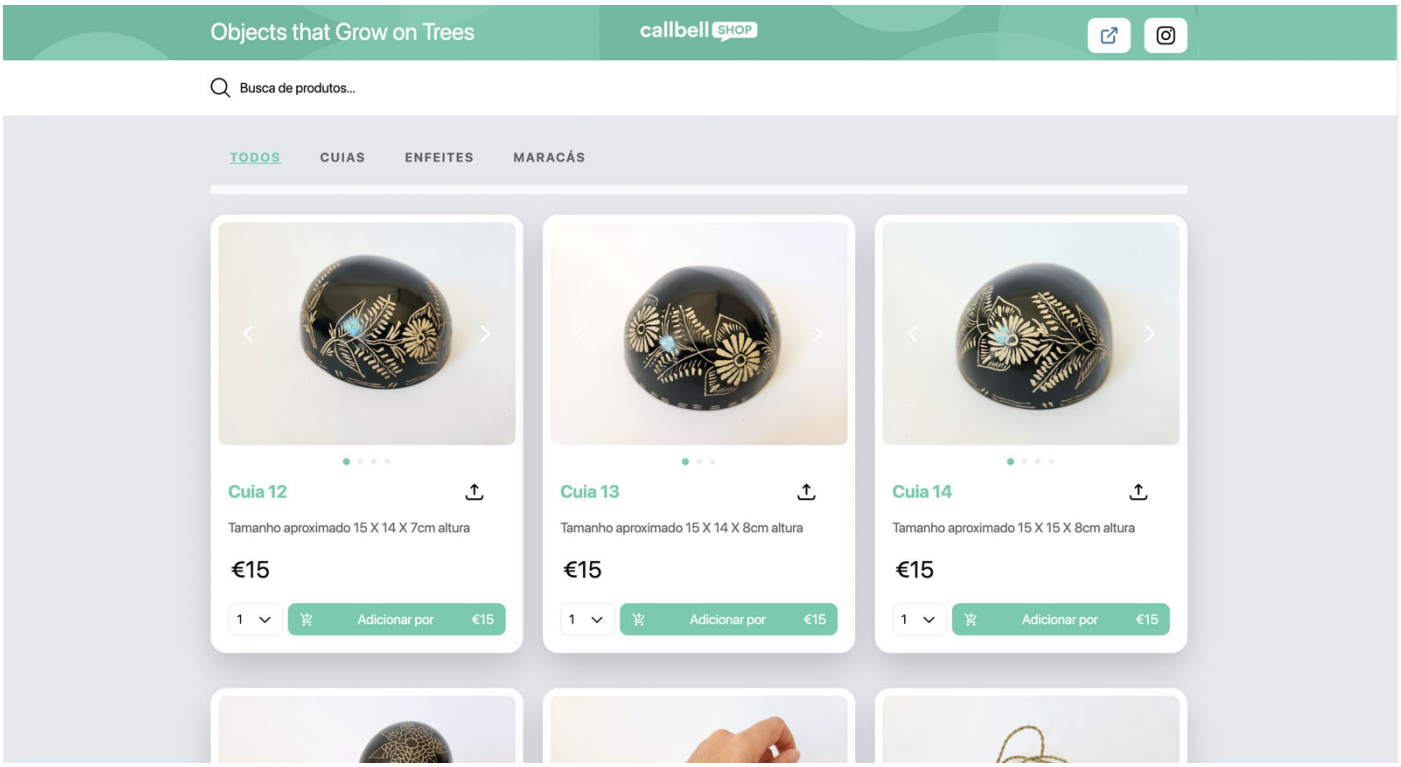

Figure 8. During the period of the exhibition, through a QR code visitors could access a website and make a reservation of the cuias in the show. Source: Author, 2024.

Links

Video accompanying this article (english, 5 min): https://youtu.be/HmN4-JdrDCI

Exhibition video “Cuia Colab” (english, 3 min): https://youtu.be/SI2-DDx8ERA

Exhibition video “7 questions to cuia artisans” (portuguese, 5min): https://youtu.be/eqOcDNv_FmI

Instagram page: https://www.instagram.com/biodesignamazonia/

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Research on Undergraduates' Entrepreneurship Model Led by User-centered Design: Insights from User Research and Service Design Courses.

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ABSTRACT | This paper investigates an innovative entrepreneurship education model for undergraduates, grounded in User – Centered Design (UCD), and explores its effectiveness through empirical research and course integration. The study highlights the significance of design thinking in fostering students' ability to develop market – viable products and redefines the traditional approach to entrepreneurship education.

The research adopts an empirical methodology, focusing on 109 junior – year Digital Media Art students who participated in an 8 – week course structured around the Double Diamond model. The course integrated product design, business models, and user research, emphasizing iterative prototyping and multidisciplinary collaboration. The teaching framework comprised four stages: Needs Exploration, Problem Definition, Solution Development, and Testing and Optimization. Through mixed – method research, including market research, in – depth interviews, and behavioral observations, students identified user needs and market gaps. The course employed tools such as the Lean Canvas, Jobs – to – be – Done framework, and System Usability Scale (SUS) to enhance the students' design and entrepreneurial skills.

The results demonstrate a significant shift in students' cognitive approaches. Initially, students struggled with user conceptualization and demand deconstruction, often focusing on technology – driven solutions. However, through UCD training, they transitioned to a needs – driven design philosophy. For instance, Student A's project evolved from a general medical rehabilitation device to a precision service for "Butterfly Children" with Epidermolysis Bullosa, while Student B's project shifted from a technology – centric "Blind – friendly Smart Kitchen System" to a demand – driven "Multimodal Guide Dog Collaboration System." Student C's "Child Speech Disorder Training System" was transformed into the gamified "Voice Adventure Island," integrating gamification and developmental feedback to enhance usability and commercial potential.

The study concludes that UCD training significantly enhances students' ability to identify latent user needs and integrate commercial value into their designs. The multidisciplinary approach and iterative process fostered innovative solutions that address real – world problems. Future research should focus on longitudinal tracking of high – performing projects to assess their market performance and commercialization pathways, as well as optimizing competition mechanisms and entrepreneurship support systems to further leverage the potential of UCD in education and industry.

KEYWORDS | User - Centered Design, Entrepreneurship Education, Design Thinking, Innovation, Commercial Value Integration

1. Introduction

In the era of innovation – driven development, the design discipline plays a crucial role as a bridge connecting professional education with innovation and entrepreneurship practices. This significance is mainly attributed to its innate ability to solve problems creatively(Ding et al., 2020).

User – Centered Design (UCD) approach, with its iterative prototyping process and emphasis on deeply understanding user empathy, effectively enables students to develop innovative products that meet real – market demands. Methodologically, it aligns with the "Build – Measure – Learn" cycle of the Lean Startup concept(Al Amin et al., 2024; Kepper et al., 2024; Tolle, 2019).

Currently, although 87% of Chinese universities offer entrepreneurship courses, only 23% manage to effectively integrate academic majors with business incubation5. This situation highlights the urgent need to transform UCD from just a set of design tools into an innovative thinking framework(Han, 2024).

To address this, we can create courses that integrate "product design – business model – user research" into a unified whole. By doing so, a replicable interdisciplinary training model can be established. Design thinking, with its practice – centric characteristics such as collaborative innovation, risk – taking, and continuous iteration, not only enhances the market competitiveness of products but also redefines the model of entrepreneurship education(Bocken et al., 2016; Dauletova, 2016; Stoehr et al., 2024).

This transformation shifts the focus of education from simply disseminating knowledge to developing practical skills, thus opening a new path of "learning entrepreneurship through practice." The integration of design thinking and entrepreneurship education, as an integrative systemic innovation, is the fundamental driving force for achieving the cyclical process of "professional education – innovation awareness – commercial transformation(Baranova, 2024; Tuzlukova & Heckadon, 2020)."

2.Literature review

The theoretical origins of User – Centered Design (UCD) can be traced back to the cognitive engineering put forward by Norman in 1986(D. Norman, 2013; D. A. Norman, 1986). Since then, its development has witnessed three significant paradigm shifts:

During the usability era of the 1990s, the focus was on task efficiency. The approach aimed to enhance operational effectiveness by streamlining processes. This was a time when making

products easier and more efficient to use was the primary goal(Gould et al., 1991).

As we entered the experience economy era at the start of the 21st century, the concept of emotional design was introduced. Here, the emphasis shifted towards users' sense of pleasure and personalized experiences, as noted by Pine and Gilmore in 1999(Pine & Gilmore, 2011). Designers began to realize the importance of creating products that not only functioned well but also evoked positive emotions and provided unique experiences for the users.

In the 2010s, the value – co – creation era emerged. This era emphasized user – participatory design(Prahalad & Ramaswamy, 2004). Through community collaboration, product iterative optimization was achieved. Users were no longer just passive consumers but active participants in the design process, contributing to the continuous improvement of products(Raghunathan, 2024).

Modern UCD has further evolved by integrating the theories of behavioral economics. It utilizes a multi – dimensional tool system(Nuske et al., 2022). Empathy maps are employed to delve into users' deep – seated needs. The Jobs – to – be – Done framework helps identify unmet scenarios, and behavioral prototyping is used to verify the feasibility of design concepts(Graham et al., 2021).

In the domain of design education, the intersection of UCD and business innovation is manifested in several aspects:

- C Curriculum integration: For instance, MIT's “Design for Entrepreneurship” course combines the Lean Canvas with sprint prototyping. This integration shows how UCD principles can be effectively incorporated into business – related curricula(Karwowski & Ahram, 2012).
- Ability cultivation: UCD practice has been shown to increase entrepreneurial self – efficacy by 42%. This statistic highlights the positive impact of UCD on developing students' confidence and capabilities in an entrepreneurial context(Eraslan Taşpınar, 2022).
- Industry verification: IDEO's design thinking can significantly shorten product market cycles(Lo et al., 2019). This demonstrates the practical benefits of UCD in the industry, improving the efficiency of bringing products to market.

Case studies consistently demonstrate the significant value of user–centered design (UCD) in fostering successful entrepreneurial ventures(Jones & Thoma, 2019; Kohno et al., 2013; Trilar et al., 2021). The results highlight the strong correlation between deep user involvement and substantial business success.

In conclusion, through continuous theoretical iteration and method innovation, UCD has not only optimized the user experience but has also become the central link connecting design thinking and entrepreneurial practice. It plays a crucial role in promoting a user – centered sustainable innovation ecosystem, where the needs of users are at the heart of all innovation and business activities(Dopp et al., 2020; Nebe et al., 2011; Ponciano et al., 2021).

3.Research methodology

3.1. Research background

This research adopts an empirical research method, selecting 109 junior – year students majoring in Digital Media Art as the sample group. This group has completed the study of basic professional courses and is at a crucial cognitive development stage of transitioning from theory to practice. They are ideal subjects for observing the effectiveness of the User – Centered Design (UCD) teaching method in cultivating innovation and entrepreneurship abilities(Ni et al., 2022; Wang et al., 2022).

The course uses the Double Diamond model to construct the teaching framework, which lasts for 8 weeks (64 class hours) and is divided into four stages:
Needs Exploration Stage: The target users are constructed through mixed research methods (market research, in – depth interviews, behavioral observations) to identify potential needs and market gaps.

Problem Definition Stage: The affinity diagram method is used to conduct thematic clustering of qualitative data, and the core design problems and target user characteristics are established.

Solution Development Stage: Design thinking tools (mind maps, storyboards) are used to carry out creative divergence, and the design concept is visualized through low – fidelity prototypes.

Testing and Optimization Stage: Based on the System Usability Scale (SUS), the solution is optimized and iterated to form an iterative design optimization mechanism(Hasani et al., 2022).

3.2. Teaching Implementation Process

The course adopts a project – driven teaching model:

The teacher establishes a project evaluation matrix through case discussions, covering multi – dimensional criteria such as innovation, commercial value, and user experience.

Students propose initial project proposals based on their own observations and conduct a structured analysis of needs using the Jobs – to – be – Done framework. The teacher evaluates the proposals from three perspectives: design goals, innovation goals, and commercial value goals, and provides improvement suggestions to form a two – way feedback

mechanism(Baluarte–Araya, 2020a).

Students iterate the proposals according to the teacher's review comments and can enter the in – depth design stage only after several rounds of reviews.

For the results, a mixed – assessment method is adopted, integrating the teacher's rubric scores and user satisfaction data to ensure the validity of the evaluation(Zhang & Chen, 2021).

4.Teaching research results and evaluation

4.1. Paradigm Shift in Teaching Outcomes

Through systematic training in User–Centered Design (UCD), learners exhibit significant cognitive restructuring across dimensions such as demand modeling, iterative prototyping, and value integration. Cross–case analysis reveals that the intervention of UCD methodology fundamentally transforms design thinking from technology–driven to needs–driven(Baluarte–Araya, 2020b).

Evolutionary Trajectory of User Positioning: Baseline data shows that learners initially suffer from fuzzy user conceptualization, manifesting as coarse–grained user segmentation based on demographic features (e.g., "elderly/children"). Through ethnographic research and stakeholder mapping training, learners successfully achieve granular user persona construction(Seregni et al., 2021).

In a typical case, Student A's initial scheme focused on "medical rehabilitation devices," suffering from scenario generalization and value positioning deficiencies(Seregni et al., 2021). Guided by teachers, through in–depth interviews with 12 burn rehabilitation patients and 6 medical practitioners, the team identified the high–demand, low–service "Epidermolysis Bullosa (Butterfly Children)" group using the contextual immersion method. This led to the design theme "Biomedical Sensing–Based Wearable Wound Management System," marking a paradigm shift from medical products to precision services(Lawani et al., 2021; Pallot et al., 2021) — Figure 1.

护创精灵
针对于蝴蝶宝贝伤口护理的服务产品设计
我们期望护创精灵能成为蝴蝶宝贝生活中的温暖守护，在对抗病痛的路上，给予他们勇气与力量，持续为这个群体的伤口护理难题带来曙光，让每个生命都绽放光芒。
护创精灵
智能敷料监测伤口
Release
Caring for your pain
护创精灵
产品三视图
色彩搭配
#FFFFFF
#9CC5E4
#DBAA24
#507489
细节设计
使用流程图
仪器不同亮灯的含义
伤口异常预警灯
透气孔
药物释放挡位调节
药物释放强度三档调节
监测仪器爆炸图
智能敷料爆炸图
底部磁吸加刻字设计
下底盖
传感器
微型摄像头
下底盖
贴合仪器磁吸部位
聚氨酯薄膜
药物释放层
监测层
透气水凝胶敷料
离型膜
监测层由多种微小的传感器和与之相连的柔性线路组成，内含温度、湿度、渗液率、皮肤压力与张力传感器
产品盒包装
IP形象设计
护创精灵，集智能敷料与监测设备于一体，超柔敷料，亲肤贴合伤口，防感染促愈合；内置微型监测器，实时捕捉温度、湿度、渗液变化，数据秒传至手机端。医护可远程追踪，患者能自主管理，为伤口护理带来更高效精准的新体验。
蝴蝶护理助手APP

Figure 1. Student A's design project: Release - Wearable product design for wound rehabilitation for butterfly babies.

Structured Upgrading of Demand Analysis: Diagnostic testing shows that 68% of learners struggle with demand deconstruction, characterized by imbalances between technical feasibility and user needs. By introducing UCD's Double Diamond Model and Requirements Engineering framework, learners progressively master systematic methods from contextual inquiry to requirements specification(Aulia, 2020).

Student B's case illustrates this transformation: the initial prototype "Blind-friendly Smart Kitchen System" centered on technological innovation. Through participatory observation, it was found that target users valued guide dog service gaps (70%) over kitchen assistance (30%). After Kano Model analysis(Z. Hu et al., 2024), the scheme evolved into "Multimodal Guide Dog Collaboration System," achieving a cognitive leap from technology-centricity to demand-centricity — Figure 2.

PILOT 引航

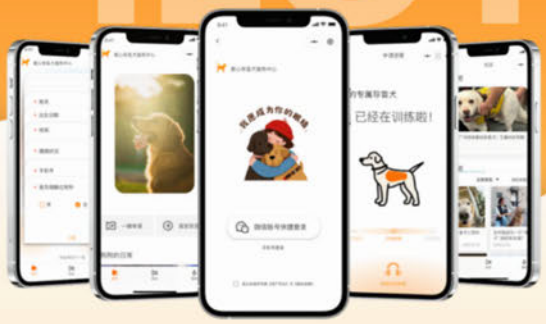
—— 线上导盲犬申请平台

PILOT

项目简介 | object background

“导盲犬与视障人士联系平台”是一个创新的微信小程序，专为视障人士设计，以提供一站式的导盲犬服务。该平台通过无障碍界面设计，使得视障用户能够轻松访问和操作，提供从导盲犬申请、训练进度跟踪到社区交流的全方位服务。它不仅简化了导盲犬的申请流程，还增强了视障人士的自主出行能力，同时构建了一个支持网络，让视障人士能够分享经验、获取信息和相互帮助。通过这个平台，我们致力于提升视障人士的生活质量，并促进社会对导盲犬重要性的认识。

主要页面



据中国盲人协会2024年5月的数据，全国共有1731万视力残疾人士，其中约800万人完全失明. 导盲犬的数量非常稀少，2019年全国现存导盲犬仅为400只左右。

服务蓝图

三方服务

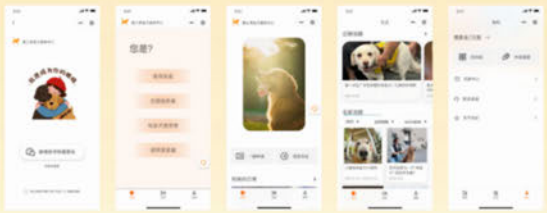
爱心导盲犬小程序实现用户互通，将三方联系起来帮助视障人士。

用户旅程图

用户画像 | user portrait

page display | 页面展示

可视化界面



可语音界面

设计规范 | design specifications

中文字体：苹方

英文字体：OPPOSANs

story board | 概念故事版

明明从小就希望拥有一只自己的导盲犬，偶然听朋友说有一个平台可以线上申请爱心导盲犬并且用过的朋友们评价都不错，我抱着试一试的心态用语音搜索PILOT引航这个小程序，他发现这个平台居然可以语音导览，需要帮助时能随时联系志愿者，我开始在志愿者的辅助下申请一只自己的狗狗，一段时间后导盲犬训练好了，我接收狗狗，开始与它的故事

Figure 2. Student b's design project: Pilot - Design of a guide dog retrieval service for the blind community.

Hierarchical Optimization of Value Integration: Post-assessment of high-fidelity prototypes indicates that UCD training significantly enhances business scalability. By integrating Business Model Canvas and Value Proposition Design tools, learners effectively balance user experience (UX) and business viability(Hartono & Ramadhan, 2022).

Student C's "Child Speech Disorder Training System" demonstrates this process: Initial adoption of traditional educational app architectures led to interaction mode standardization issues. By incorporating gamification design, narrative learning mechanisms, and developmental acoustic feedback systems, the scheme evolved into the IP-potential "Voice Adventure Island." Usability tests and TAM model adoption forecasts validate this transformation's efficacy(Ary, 2022; Van Der Walt et al., 2021) — Figure 3.

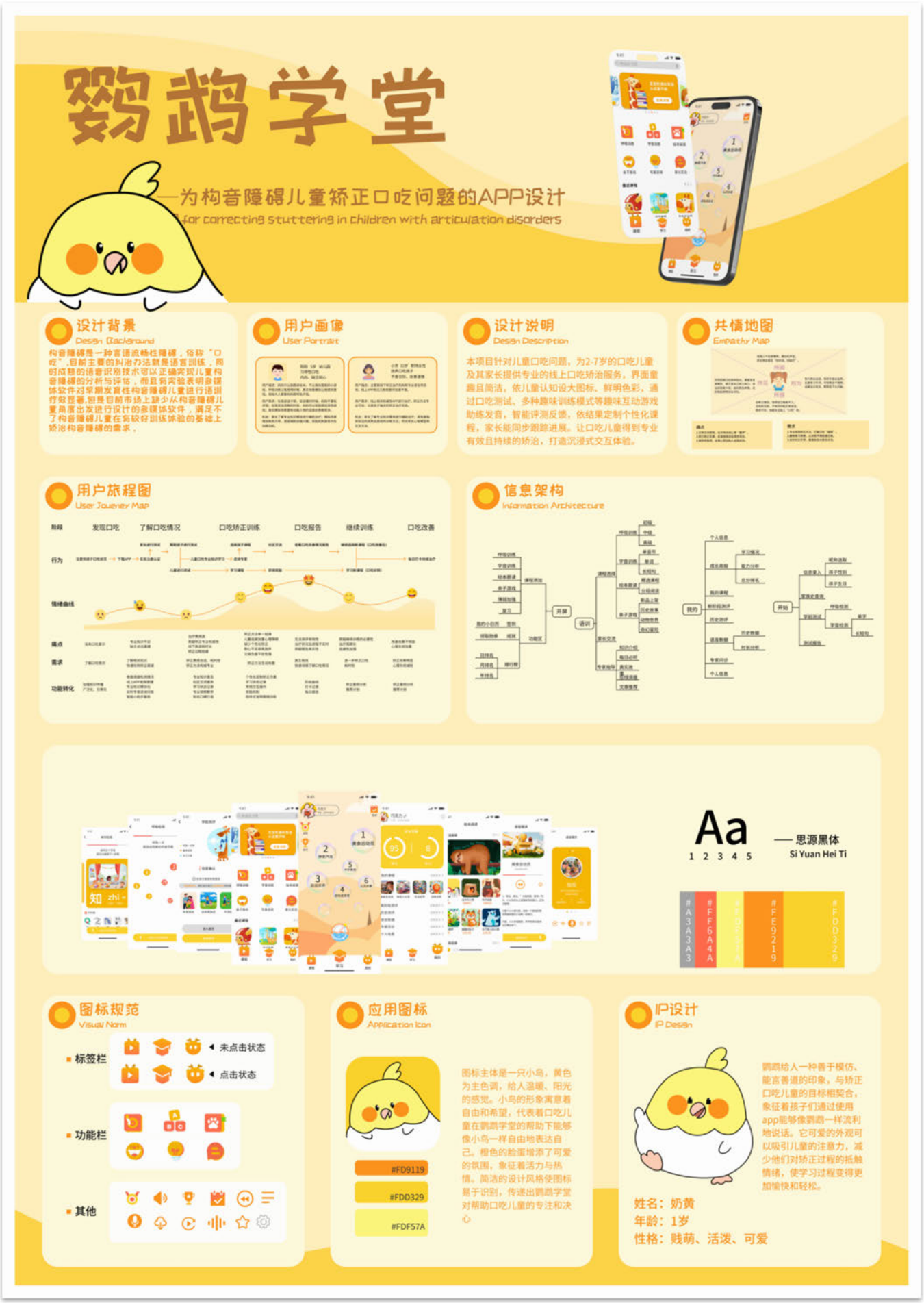

鹦鹉学堂
为构音障碍儿童矫正口吃问题的APP设计
for correcting stuttering in children with articulation disorders
设计背景
Design Background
构音障碍是一种言语流畅性障碍，俗称“口吃”，目前主要的纠治办法就是语言训练，同时成熟的语音识别技术可以正确实现儿童构音障碍的分析与评估，而且有实验表明多媒体软件对早期发育性构音障碍儿童进行语训疗效显著，但是目前市场上缺少从构音障碍儿童角度出发进行设计的多媒体软件，满足不了构音障碍儿童在有较好训练体验的基础上矫治构音障碍的需求。
用户画像
User Portrait
设计说明
Design Description
本项目针对儿童口吃问题，为2-7岁的口吃儿童及其家长提供专业的线上口吃矫治服务，界面童趣且简洁，依儿童认知设大图标、鲜明色彩，通过口吃测试、多种趣味训练模式等趣味互动游戏助练发音，智能评测反馈，依结果定制个性化课程，家长能同步跟踪进展。让口吃儿童得到专业有效且持续的矫治，打造沉浸式交互体验。
共情地图
Empathy Map
用户旅程图
User Journey Map
阶段
发现口吃
了解口吃情况
口吃矫正训练
口吃报告
继续训练
口吃改善
行为
情绪曲线
痛点
需求
功能转化
信息架构
Information Architecture
Aa
1 2 3 4 5
思源黑体
Si Yuan Hei Ti
#A3A3A3
#FF6A4A
#FE9219
#FDD329
图标规范
Visual Norm
标签栏
未点击状态
点击状态
功能栏
其他
应用图标
Application Icon
#FD9119
#FDD329
#FDF57A
图标主体是一只小鸟，黄色为主色调，给人温暖、阳光的感觉。小鸟的形象寓意着自由和希望，代表着口吃儿童在鹦鹉学堂的帮助下能够像小鸟一样自由地表达自己。橙色的脸蛋增添了可爱的氛围，象征着活力与热情。简洁的设计风格使图标易于识别，传递出鹦鹉学堂对帮助口吃儿童的专注和决心
IP设计
IP Design
鹦鹉给人一种善于模仿、能言善道的印象，与矫正口吃儿童的目标相契合，象征着孩子们通过使用app能够像鹦鹉一样流利地说话。它可爱的外观可以吸引儿童的注意力，减少他们对矫正过程的抵触情绪，使学习过程变得更加愉快和轻松。
姓名：奶黄
年龄：1岁
性格：贱萌、活泼、可爱

Figure 3. Student C's design project: Parrot Learning - stuttering correction app design for children with dysarthria.

4.2. Teaching Guidance and Evaluation Mechanism

The goal – setting framework: Based on the analysis of the design context, teachers should systematically deconstruct the project elements, clarify the technological constraints and the core demands of the users, and accurately define the boundaries of the design challenges(Lang, 2021). In this process, it is necessary to integrate the T – shaped knowledge structure, establish a dual – track analysis model of "technical feasibility – commercial value", deconstruct the market dynamics through the business model canvas tool, and guide students to build solutions with technological innovation and commercial feasibility(Pardo–Garcia & Barac, 2020).

The evaluation system innovation pathway: Build a four – dimensional evaluation matrix (innovation index, demand fit, technology realization, and commercial value potential), and adopt Rubric tools to realize the operationalization of evaluation indexes. Implement a staged evaluation mechanism: focus on feasibility simulation in the proof – of – concept stage, technical and economic analysis in the prototype development stage, and market sensitivity testing in the commercialization stage. Form the "Trinity" feedback mechanism: Peer Review for cognitive conflict, Teacher Diagnostic Evaluation for professional calibration, and Reflection Journal for metacognitive development(Galvez et al., 2018; T. Hu et al., 2023; Хоменко & Решетняк, 2024).

To address the problems of discrete innovations or lack of value in the project, teachers need to use the Gap Analysis tool to locate the specific weaknesses, such as the deviation in the identification of user pain points, the deviation of technical parameters from the application scenarios, and the inaccurate prediction of market trends. Develop differentiated enhancement plans: introduce industry mentorship to strengthen business thinking, optimize business models through Design Sprint, and carry out interdisciplinary workshops to stimulate innovation potential. Eventually, a spiral mechanism of "assessment–feedback–iteration" will be formed, so that students can realize theme optimization in the synergistic evolution of design thinking and business insights(G. Gonio & M. Bauyot, 2024; Khan et al., 2023; Nab et al., 2014).

5.conclusion

5.1. Main Findings

UCD Training Significantly Enhances User Needs Insight: Students receiving UCD training systematically learn user research methods (e.g., behavioral observation, emotional analysis), enabling them to identify latent user needs more accurately and translate these into design directions. This improvement stems from UCD's "user–focus" principle, which refines design goals through iterative testing and feedback. However, students' understanding of user knowledge is not instantaneous; it develops gradually through design activities, with solutions

often adjusted even during high-fidelity prototyping stages, reflecting UCD's non-linear nature(Ferran et al., 2009).

Pain Points and Opportunity-Driven Innovation: In UCD practice, deep user interactions (e.g., interviews, testing) allow students to uncover pain points and opportunities while redefining problem boundaries from the user's perspective. For instance, in healthcare, interdisciplinary collaboration under UCD transforms user needs into technical requirements, offering innovative solutions to complex issues. However, overreliance on user feedback may lead to conservative designs, necessitating a balance between designer-led hypothesis extrapolation and practicality(Dopp et al., 2019, 2020b).

Commercial Value Requires Multidisciplinary Integration: UCD's "market-opportunity-oriented" teaching methods (e.g., commercial feasibility analysis) help students focus on a product's commercialization potential(Hoffenson & Fay, 2021). For example, formal UCD implementation in automotive manufacturing unifies cross-disciplinary team goals, avoiding self-referential design biases and enhancing commercial competitiveness. However, insufficient training in business logic (e.g., cost-benefit analysis) may weaken the practical value of designs(Li & Hai-chao, 2018; Liem & Sanders, 2011).

5.2. Future Research Directions

Long-Term Tracking of High-Performing Projects: It is recommended to conduct longitudinal studies on outstanding course projects to observe their market performance (e.g., user retention, conversion rates) and commercialization pathways. For instance, integrating the "UCD Sprint" framework could assess the impact of structured methodologies on project sustainability while analyzing challenges in interdisciplinary collaboration (e.g., conflicting stakeholder goals)(Jeeva Mohana Chandran & M. Reyasudin Basir Khan, 2024; Lake et al., 2021; Smith et al., 2023).

Optimizing Competition Mechanisms and Entrepreneurship Support: Further research is needed to align competition evaluation criteria with UCD core competencies. Drawing from the ISO 13407 standard(Siricharoen, 2010), an assessment system centered on user-need fulfillment could be established, alongside pathways for translating competition outcomes into entrepreneurship. Additionally, continuous tracking of post-course entrepreneurial intentions and behaviors is critical to understanding UCD's long-term impact on student innovation.

This conclusion integrates UCD's educational benefits, innovation dynamics, and commercial implications, while proposing actionable future research agendas grounded in empirical and methodological evidence.

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THE DESIGN MINDSET: challenging short course formats in design thinking

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ABSTRACT | What is the key difference between teaching design thinking in business school v/s entrepreneurial skills in design school? This is a question pertaining to the growth and pedagogy at the design school the author represents. This experiment uses insight from the current learner community for unpacking as well as proposing a future focused entrepreneurship-led design learning model.

As design has evolved over the past decades, from artefacts to systems, to services, to policy and much more, our models of articulation and pedagogical dissemination do not yet reflect this evolution. Vestiges of industrially defined service theories continue to appear in how the design discipline is currently viewed, despite our evolution outside of artefacts as design output. As designers continue to be entrepreneurs against the grain of our education, our B-school counterparts seem to dominate leadership roles.

Tools like design thinking, critical thinking, and journey maps are being pedalled in short 40-hour bursts, disregarding the mindset which is built through a creative education towards the penchants of problem-solving. This ongoing research aims to create a pedagogical framework keeping the design mindset at the centre, challenging and realigning the current rise in short course formats, claiming otherwise.

KEYWORDS | collective creating, care and profit, pedagogical design

1. Introduction

As part of an international experiment, the consortium of students, designers and educators joining the X-Format session, use an experimental methodology of moving building blocks over a pre-determined structure to ideate on models of imparting design and entrepreneurial skill combined.

Starting with a controversial question:
Should designers with entrepreneurial skills be leaders or business graduates with design thinking skills?

We delve into unravelling this mystery and collectively ideating on a value-centric approach. This experiment is made public and invites results from groups and individuals across the world.

2. Designed Experiment

By collective agreement, we divide into two teams of 5-7 (or more) participants, where the core principles of care and profit are at the centre for two different groups.

This experiment intends to unravel whether it is the nature of the people designing the pedagogical framework or the content itself that takes us away from a balanced approach.
As part of multiple planned sessions, the collective qualitative data will share insight into the perspective of designers. If provided the opportunity, the same would be conducted with business experts to derive a qualitative understanding of the future potential landscape that resides and flourishes between the learning paradigms of design and business.

2.1. Participation

Each group would have the first 5 minutes to quickly discuss their principles, the direction they want to move in, and how they would consider providing care or profit as the central theme of their pedagogical frameworks.

There would be prompts introduced to the group every 60-90 seconds, which would allow them to place one building block above or below, to the side, between the others, around them, etc. Once placed, the blocks cannot be moved.

Examples of prompts are below:

- What would you build the foundation out of?
- What would this framework use as its bone structure?
- What is the key skill you want to impart? the beating heart
- I am sure you had many, add 2 more skills
- Would you want to add some muscle/ tendons?
- What ideal role would this individual take in the world?
- Do they need to repeat-learn any particular skill?
- and a few more...

Finally, once they have responded to each prompt rapidly (yet as a group), they have another 3 minutes to quickly make any final changes, adjustments and movements. This is the only time when the movement of framework components is possible.

Once complete, we look at the two models and bring forth questions, observations and insights to the table. To be recorded for future possibilities and as a directory of responses to draw parallels from and to build insights out of.

2.2. What do we take away?

Each team quickly takes us through their structure, the foundation, the building blocks and the output. Including their suggestions, their unresolved bits and their future potential.

There is no way that we can solve this concern in one workshop, but it is possible to look beyond our approach of pitting design schools against business schools. Both schools bring value, and if only the in-between of the design entrepreneur or a creative businessperson were given a chance.

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An Educational Design Strategist, Mudita works with experiential and experimental strategies within educational, environmental and social systems, dabbling with a variety of scales and approaches. Working

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An advocate for decentralized museological experiences, Mudita is a gatherer at heart, often most comfortable in keenly observing people, ideas and spaces. She is currently the Academic Dean of an internationally acclaimed design school, The Design Village.

Chapter 7

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A Review of Everyday Design History: Paradigm Shifts, Research Boundaries, and Future Directions

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ABSTRACT | This paper revisits the emerging field of Everyday Design History by identifying its structural limitations and proposing an analytical framework that addresses ethical, methodological, and representational concerns. While the field has expanded its focus from elite authorship to mundane artifacts, it remains shaped by implicit boundaries—geographical, representational, and ethical—that constrain whose practices are visible, whose voices are legitimated, and how design is interpreted. Through a critical review of existing literature and methodological debates, the study maps these intersecting boundaries and explores how digital platforms and AI tools complicate traditional research approaches. To respond, it introduces a multi-layered framework that analyzes everyday design across three levels: individual (personal adaptation and agency), community (relational design and cultural resistance), and global (platform aesthetics and algorithmic power). This structure reveals how different scales of practice encode power, visibility, and epistemic hierarchies. By aligning design history with multi-scalar ethics and critical inquiry, the paper offers a methodological and conceptual tool for interrogating design's social embeddedness. It contributes to the development of more inclusive, reflexive, and ethically attuned approaches in both historical research and contemporary design analysis. The proposed framework not only clarifies analytical categories, but also enables researchers to navigate the complexities of everyday design in a platform-mediated, globally uneven world.

KEYWORDS | everyday design history, material culture, design methodology, social culture, globalization in design

1. Introduction: Why Revisit Everyday Design History Now?

For much of the twentieth century, design history prioritized aesthetic innovation, industrial progress, and iconic designers—largely reflecting Western modernist ideals. These narratives often overlooked the social, cultural, and material dimensions of design embedded in everyday life. In response, scholars began drawing on material culture, design anthropology, and user-centered approaches to examine how ordinary objects—household tools, furniture, digital devices—shape identity, behavior, and lived experience (Attfield, 2000; Heskett, 2002; Miller, 2010). This transition has contributed to the rise of Everyday Design History, which emphasizes the cultural significance of mundane artifacts.

Yet, as the field expands to encompass everyday practices, it faces new conceptual and ethical challenges. Everyday design is now increasingly mediated by platforms, algorithms, and global cultural flows—raising critical questions about visibility, authorship, and exclusion. Issues such as sustainability, algorithmic bias, and representation underscore the need to revisit the field's ethical foundations.

This study critically reviews the development of Everyday Design History and examines its unresolved boundaries—particularly in geography, representation, and methodology. It introduces a Multi-Layered Everyday Design Framework addressing individual, community, and global levels. By connecting past design responses to contemporary dilemmas, the paper positions Everyday Design History as a key perspective for engaging ethical tensions and power dynamics in today's design discourse.

2. From Canon to Commons: Paradigm Shifts in Everyday Design

The rise of Everyday Design History signals not only a shift in subject matter but a deeper transformation in how design history is theorized and written. Departing from the long-standing emphasis on named designers and aesthetic movements, scholars increasingly examine how ordinary artifacts shape social life. This shift stems from critical historiographical reflection—questioning whose stories are told, what is archived, and how authority is distributed among users and makers. As such, Everyday Design History becomes not an extension of tradition but a methodological and epistemological intervention.

The first phase of this intervention emerged in the mid-20th century through "anonymous" design histories. Pioneers like Sigfried Giedion and Reyner Banham redirected attention from iconic figures to mass-produced technologies—elevators, kitchens, infrastructures—that silently transformed modern life. Giedion emphasized the social function of standardization, while Banham saw consumer goods as culturally generative. These works destabilized designer-centric narratives and legitimized the material environment as a subject of historical scrutiny.

In the 1990s and 2000s, scholars like Attfield (2000), Forty (2012), and Julier (2007) expanded the field by linking objects to identity, class, and domesticity. Attfield affirmed the significance of banal objects; Forty highlighted how material choices express ideology; Julier framed "design culture" as an ecosystem connecting products, media, and markets. This phase institutionalized everyday design as central to understanding how material culture mediates modern life.

A third and ongoing phase engages global inequality, decolonial critique, and ethics. Tunstall (2020), Akama and Yee (2024), and Zhang (2024) critique Western-centric frames and call for plural epistemologies. Tunstall foregrounds Indigenous knowledge; Akama and

Yee emphasize participatory frameworks in Asia-Pacific contexts; Zhang conceptualizes everyday design history as both subject and historiographical method. These perspectives shift focus from canonical subjects to ethical responsibility and positionality.
Together, these phases redefine design historiography—moving from authorship to practice, aesthetics to meaning, and canon to plurality. This repositioning frames everyday design as a site of cultural insight and political relevance, and urges renewed reflection on how histories are constructed and whose lives are archived.

3. Research Boundaries and Blind Spots: Geography, Representation, Ethics

Although Everyday Design History has expanded the scope of design studies, it remains shaped by underlying research boundaries—structural constraints that govern what is studied, whose voices are legitimized, and how interpretation occurs. These boundaries—geographical, representational, and ethical—are not just omissions but systems of knowledge regulation that condition academic focus, shape epistemology, and structure authority.
This chapter introduces a framework organized around three interrelated boundary regimes: (1) Geographical boundaries, which determine where design is studied and which regions are marginalized; (2) Representational boundaries, which influence whose practices and perspectives are included; and (3) Ethical boundaries, which shape how researchers engage with subjects, platforms, and data. Together, these boundaries diagnose exclusion and illuminate how design knowledge is policed.
Geographical boundaries are visible in the field's concentration on urban, Western, and Anglophone contexts (Fallan, 2010). Practices in China, Southeast Asia, and Latin America are often analyzed through Western frames, reinforcing hierarchies. Indigenous and diasporic knowledge systems are largely absent from dominant methodologies (Escobar, 2018). Overcoming these biases requires embracing local, multilingual, and transregional perspectives (Clarke, 2011).
Representational boundaries shape which social actors are visible. While claiming inclusivity, the field has focused on middle-class consumer-citizens, underrepresenting laborers, caregivers, informal workers, and marginalized gender and racial groups. Shove et al. (2007) show how maintenance labor shapes design, yet it is rarely acknowledged as historical agency. Pérez-Bustos (2021) describes such exclusions as epistemic injustice. Addressing them requires inclusive narratives and collaboration with communities beyond academia.
Ethical boundaries arise as the field increasingly intersects with digital platforms and AI tools. Techniques like social media archaeology or algorithmic image analysis offer insights but raise concerns over ownership, visibility, and platform bias. Platforms such as Xiaohongshu and TikTok curate aesthetics that marginalize vernacular styles. Researchers risk reproducing these hierarchies if they ignore positionality or consent (Doordan, 1996). Ethical leadership must therefore embrace reflexivity, transparency, and accountability.
These boundary regimes overlap in regulating visibility, legitimacy, and power. As both diagnostic and critical tools, they provide a foundation for more inclusive and ethically attuned research in Everyday Design History.

4. Everyday Methods, Digital Platforms, and Ethical Dilemmas

As everyday design increasingly unfolds within digital and algorithmic infrastructures, traditional research methods must adapt. This evolution requires more than technological upgrades—it also demands ethical reflection. This chapter explores how digital mediation reshapes methods in Everyday Design History and calls for a reflexive, ethically grounded research paradigm responsive to representation, responsibility, and power.

Historically, everyday design research has relied on qualitative and interpretive tools rooted in material culture, ethnography, and visual analysis. Techniques like domestic observation, object-centered interviews, and archival work highlight how artifacts shape social life (Woodward, 2007; Pink, 2012). These approaches emphasize thick description and everyday experience. Yet, they struggle to address the dynamic, platform-based temporality and algorithmic filtering that increasingly define everyday design. This gap requires methodological renewal.

Emerging tools—social media archaeology, AI image recognition, data scraping—enable real-time, large-scale analysis. For example, Scholars have shown how AI image recognition and algorithmic curation construct aesthetic norms that marginalize clutter, improvisation, and vernacular expressions. Manovich (2017) explains how platforms automate aesthetic judgment, while Donnarumma (2022) analyzes how algorithmic systems reproduce cultural bias and visual hierarchies in the name of efficiency and neutrality.

In response, scholars call for reflexivity and methodological ethics. Akama and Yee (2024) advocate for participatory research entangled with local contexts and socio-political complexity, emphasizing relational accountability over extractive knowledge. Winschiers-Theophilus, Smith, and Botero (2024) propose decolonial design approaches that redistribute narrative authority and challenge Western epistemic dominance in participatory design. Studying digital traces demands interpretive care: extracting data without context risks instrumentalizing users. Ethical leadership thus involves not only consent and transparency, but also responsibility for narrative representation and power awareness. Research methods, like design itself, are shaped by history and values.

5. Multi-Layered Framework: From Classification to Critical Engagement

Previous chapters have outlined the boundaries and ethical dilemmas shaping how everyday design is studied. These issues—geographical exclusions, representational gaps, and platform biases—highlight the need for a scalable framework. This chapter introduces a multi-layered model that analyzes everyday design across individual, community, and global levels. Rather than merely classifying practice, the model reveals how power, agency, and ethics unfold at different scales, showing how micro-decisions, collective traditions, and global infrastructures interact to shape meanings and exclusions.
The individual level focuses on personal adaptation and micro-level decisions. Influenced by De Certeau (1984), it examines how users repurpose, modify, or reinterpret objects in daily life. Such “vernacular creativity” (Burgess & Green, 2009) includes reusing packaging, customizing furniture, or adjusting interfaces—often shaped by gendered labor, economic constraint, and embodied care. These practices reflect resistance and situated agency, not just consumption.

At the community level, design emerges as a shared cultural process. In Indigenous, postcolonial, or rural contexts, collective making often bypasses institutional norms, relying on reciprocity, ecological values, and intergenerational knowledge. Design is co-produced through ritual, storytelling, and place-making, becoming a medium of cultural resistance and socio-political identity. From Latin American cooperative housing initiatives—such as the FUCVAM model in Uruguay or grassroots experiments in Colombia and El Salvador—to Chinese repair collectives, communities use design to assert autonomy and challenge dominant norms (Bredenoord, 2017; Barenstein & Sanjinés, 2019; Zhong & Leung, 2019).

Globally, design practices are shaped by algorithmic platforms and aesthetic regimes. Platforms like TikTok, Xiaohongshu, and Instagram curate desirability through opaque algorithms. Yu, Xu, & Sun,（2022） notes that they privilege minimalism, order, and commercial aesthetics while marginalizing cluttered or localized styles. Vernacular practices become decontextualized and commodified. The global layer exposes how platforms structure not only taste and visibility, but also design's cultural legitimacy.

This multi-layered framework clarifies how design operates across intersecting systems of power. It reveals how global logic reconfigures personal aesthetics, and how communities resist digital homogenization. Beyond analysis, it supports ethical leadership by surfacing design's epistemic hierarchies and advancing multi-scalar sensitivity in research and pedagogy. As both an analytic and critical tool, it enables Everyday Design History to confront its blind spots and engage more reflexively with cultural power.

6. Conclusion: Revisiting the Field through Boundary and Scale

This study critically examined how Everyday Design History has developed as a field of inquiry, identifying key tensions and structural limitations. It mapped out three intersecting research boundaries—geographical, representational, and ethical—and explored how recent methodological transformations intersect with the ethical dilemmas introduced by digital platforms and AI-driven tools. In response, a multi-layered analytical framework was introduced to situate everyday design across individual, community, and global levels. This structure demonstrates how different scales of design activity are shaped by power, agency, and visibility. Rather than positioning Everyday Design History as a peripheral perspective, the framework reframes it as a critical lens for interrogating design's cultural embeddedness, knowledge hierarchies, and ethical responsibilities. In doing so, the study contributes to building more inclusive, reflexive, and socially attuned approaches in contemporary design research.

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A Technology-Based Taxonomy for Smart Home-Use Medical Devices

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ABSTRACT | In the context of Digital Transformation, Smart Products are emerging as pivotal means to deliver complex services to end users across many industries. Thanks to the integration of many advanced technologies, they acquire innovative functionalities and connectivity features, factors that have been used to classify their typologies. The technologies that enable such innovations have been defined as Key Enabling Technologies (KETs), examples of which include Artificial Intelligence, Life-Science technologies, and IoT systems.
Specifically in the Healthcare field, these technologies have driven innovation by enabling the development of advanced smart medical devices, with the aim of improving the fulfillment of their medical purposes while ensuring the safety of their users.
This phenomenon strongly emerges in the Home Care sector, where medical services delivered within domestic environments have become a viable alternative to other forms of care for an increasing number of patients, due to the COVID-19 pandemic experience. Although the Home Care sector is expected to experience significant growth in the coming decade, there remains, to the best of our knowledge, a gap in the literature concerning the categorization of Smart Home-Use Medical Devices (Smart HUMDs).
This study is part of a research project whose general objective is to investigate how the integration of KETs influences the design process of Smart HUMDs. In particular, this study aims (i) to identify an effective taxonomy for the classification of Smart HUMDs and (ii) to investigate how the KETs are deployed by these products.
The results show that a reinterpretation of the existing taxonomy for Smart Product Typologies was needed to effectively describe Smart HUMDs and their technological capabilities.

KEYWORDS | HOME CARE, HEALTHCARE DESIGN, MEDICAL DEVICE, DIGITAL TECHNOLOGY

1. Introduction: Smart Products in Home Care

Thanks to the technological advancements introduced during the years of Digital Transformation in developed countries, the industrial sector has access to a variety of new technologies that can improve product development and service delivery.
The document entitled "Key Enabling Technologies for Europe's Technological Sovereignty," published in 2021 by the European Parliamentary Research Service (Batura et al., 2021), provides a list of Key Enabling Technologies (KETs) that can be integrated into products to “enable” the implementation of innovative functionalities. Examples of these technologies include Artificial Intelligence, Life-Science technologies, and IoT systems, which have been categorized based on their industrial applications.
Products that integrate KETs to provide users with advanced functionalities have the potential to be regarded as Smart Products. However, to be classifiable with this denomination, the following key attributes must also be possessed: thickness, depth, and transformativeness (Pardo et al., 2020). The first attribute refers to Smart Products being constituted by both a physical and an informational dimension. The second attribute pertains to Smart Products serving as gateways or receivers, facilitating the transfer of information between various entities, including humans. The last attribute refers to the capability of a smart product to transform any user into data, ultimately expanding the classical user-product relationship in which the user only “uses” the product to a relationship of reciprocal usage.
The authors also propose 4 typologies of Smart Products, namely More Efficient Product (MEP), Advanced Product (AP), Product-as-a-Node (PN), and Products-as-a-Hub (PH). MEPs are products that become more efficient thanks to the acquired capability to communicate information to one or a few other entities without, however, featuring substantial improvements in their functions; APs are products that have additional functional features while remaining independent from other entities in their system; PNs are products that do not feature additional functions, but collect information from or send information to a large number of entities at the same time; PHs are products that become central in a system, not only by offering innovative functions but also by sharing information with a multitude of different entities. Finally, the authors define “Dumb” Products (DP) those products that do not present the prerequisites to be defined as “Smart”.
In the domain of Smart Products, many technological advancements have also been made in the Healthcare sector. Due to the COVID-19 pandemic global experience, Home Care services have become a viable alternative to other forms of care for an increasing number of patients (Stepick & Tran, 2022). Indeed, benefits like fewer hospital readmissions, minor exposure to infectious diseases, minor health costs, more accurate patient assessment, and higher patient autonomy (Stapleton & Bossie, 2024) pushed the sector to provide increasingly capable medical services, delivered through Home-Use Medical Devices (HUMDs). These products often integrate KETs to provide users with advanced services. For instance, the Internet of Things (IoT) can be used to create a system of interconnected devices to enhance patient monitoring and management (Muneer et al., 2020). However, although the Home Care sector is expected to experience significant growth in the coming decade (Precedence Research, 2024), there remains, to the best of our knowledge, a gap in the literature concerning the categorization of Smart HUMDs.
This study aims (i) to identify an effective taxonomy for the classification of Smart HUMDs and (ii) to investigate how the KETs are deployed by these products.

2. Methods: Collection and Analysis of Case Studies

To achieve the aims of this study, case studies of Smart HUMDs will be collected. Their selection will be guided by the decision to cover all medical purposes (MDR 745/2017) and all categories of HUMDs (Olson, 2010) with at least one case study.
Moreover, the case studies will be considered valid for inclusion only if they are characterized by the 3 aforementioned key attributes for a product to be smart, namely Thick, Deep, and Transformative (Pardo et al., 2020).
The case studies will be further examined in their respective product instances, i.e. the components that constitute the Smart HUMD. This evaluation will be conducted by considering the functionally integrated Key Enabling Technologies (KETs) (Batura et al., 2021) and the typologies of Smart Products to which they belong (Pardo et al., 2020) as key parameters for assessment. Finally, the Product instances will be graphically represented with a benchmarking to highlight the relation between product instances, KETs, and the typologies of Smart Products, to also evaluate the effectiveness of the taxonomy adopted.
This study is part of a research project whose general objective is to investigate how the integration of KETs influences the design process of Smart HUMDs. In particular, it is part of the first specific objective, which is to define the concept of Smart HUMD, identifying which KETs are responsible for the innovative features that make these products “Smart”, followed by the identification of the design opportunities and limitations introduced by these technologies.

3. Results and Discussion: A New Taxonomy for Smart HUMDs

To conduct this analysis, a total of 9 case studies of Smart HUMDs have been collected and reviewed. Table 1 details the Smart HUMDs analyzed by differentiating them between the systems (9) and the instances that compose them (19). The systems have been described in the medical purposes they fulfill. Their instances have been then inspected in the KETs they integrate and classified according to both the taxonomy proposed by Pardo et al. (2020) and the one proposed in this study.

Table 1. Case studies analyzed.

Smart HUMD (system)	Medical Purposes	HUMD Type	Smart HUMD (instance)	KETs adopted	Smart Product Typology (Pardo et al., 2020)	Smart Product Typology (Proposed Taxonomy)
Medipense RxPense Patel et al.,	Monitoring	Medication Administration Equipment	1. Dispenser	IoT Sensors & Tokens, IoT Networks & Protocols, Standards,	AP	AP

2023				Autonomous Systems, Network Architecture		
			2. Digital Portal	IoT Networks & Protocols, Network Architecture	PH	PH
			3. Mobile App	Network Architecture, IoT Networks & Protocols	PN	SN
HIV-Hemoglobin Test Guo et al., 2015	Diagnosis, Prevention	Test Kits	4. Dongle	Medical Engineering, Bioengineering	AP	AP
Smart Exoskeleton Sandison et al., 2020	Treatment, Alleviation	Assistive Technology	5. Motorized Exoskeleton	Medical Engineering, Standards	AP	AP
			6. Mobile App	Network Architecture, Standards	PN	SE
Smart Toilet Bhatia et al., 2020	Diagnosis, Monitoring, Prediction	Durable Medical Equipment, Voiding Equipment	7. Smart Toilet	IoT Networks & Protocols, Medical Engineering, IoT Sensors & Tokens	AP	AN
Homechoice Claria + Claria Sharesource Wood et al., 2019	Monitoring, Treatment	Treatment Equipment	8. Cycler of Peritoneal Dialysis	IoT Networks & Protocols, Medical Engineering	MEP	MEP
			9. Remote Patient Management Platform	IoT Networks & Protocols	PN	SN
Smart Nebulizer Zhou et al., 2018	Monitoring	Respiratory Equipment	10. Nebulizer	Medical Engineering	DP	DP
			11. Smart Add-On	Standards	PN	SE
			12. Smart App	Standards	PN	PH
Kangaroo Feeding Tube Taylor et al., 2021	Diagnosis, Monitoring	Feeding Equipment	13. Feeding tube	Medical Engineering, Deep Learning	AP	AP

Owlet Smart Sock Dangerfield et al., 2017	Monitoring, Prediction	Infant Care	14. Sensorized Smart Sock	Standards, IoT Sensors & Tokens, Medical Engineering	PH	PH
			15. Base Station	Standards, IoT Networks & Protocols, Network Architecture	PN	SE
			16. Owlet App	Deep Learning, IoT Networks & Protocols, Network Architecture	PN	AN
ExerCam Rosique et al., 2021	Monitoring, Prognosis, Treatment	Telehealth Equipment	17. ExerCam Website	Standards, Network Architecture	PH	PH
			18. ExerPlayer	Deep Learning, Medical Engineering, Network Architecture, IoT Sensors & Tokens	AP	AN
			19. BD Exercam	Medical Engineering, Network Architecture	MEP	MEP

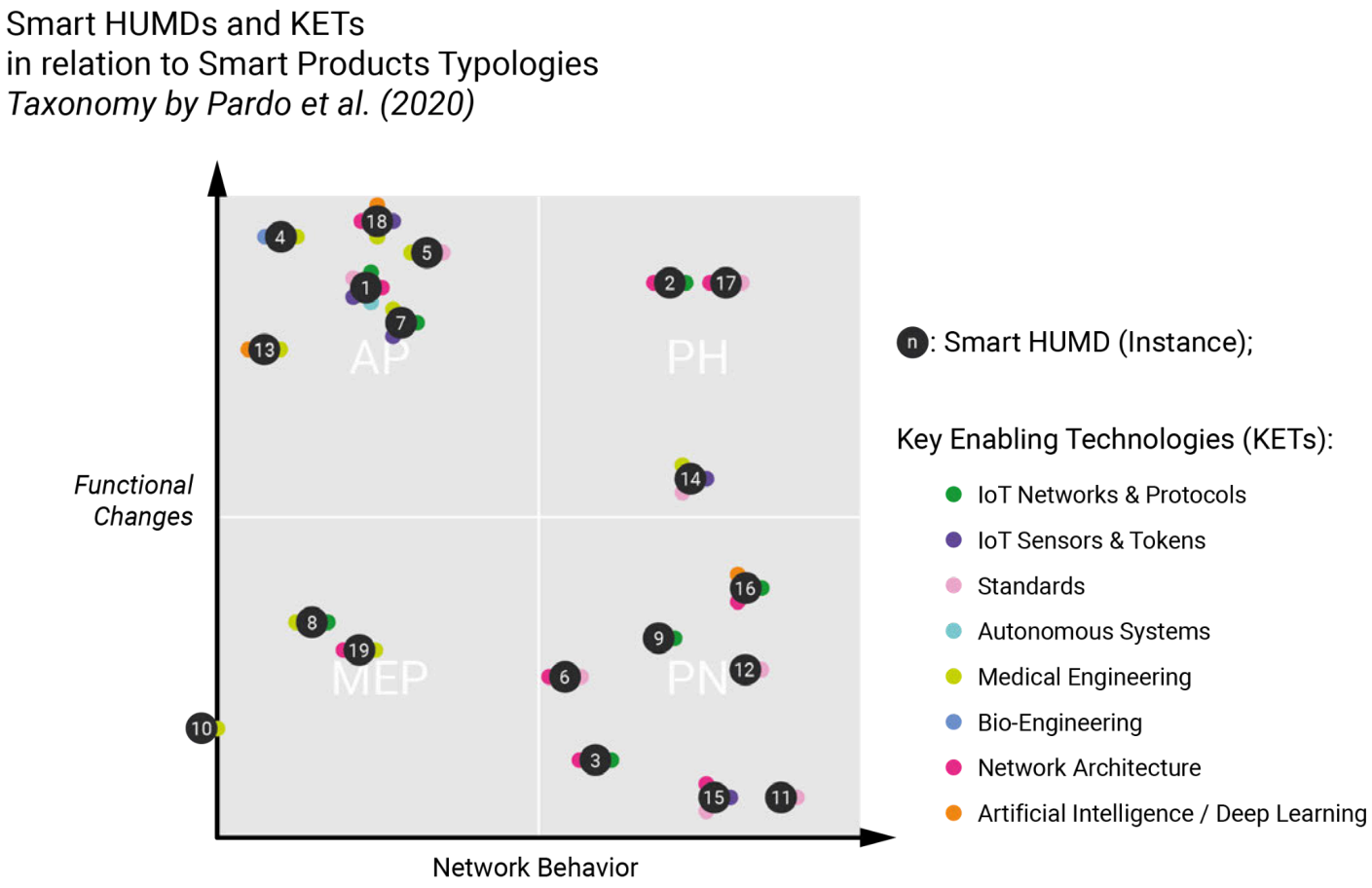

Figure 1. Benchmarking of Smart HUMDs (instances) and Key Enabling Technologies (KETs) in relation to Smart Product Typologies, utilizing the taxonomy proposed by Pardo et al. (2020).

The Typologies of Smart Products proposed by Pardo et al. (2020), i.e. MEP, AP, PN, and PH, have been valuable in achieving the objectives of this study. However, the benchmarking presented in Figure 1, which is based on these typologies, raised concerns regarding the effectiveness of this taxonomy to accurately characterize Smart HUMDs for many reasons. The first notable point is that it was originally conceived for categorizing Smart Business Products, which greatly differ from Smart HUMDs. Indeed, according to the Medical Device Regulation 745/2017, every product instance that composes a medical device must also be considered a medical device. It has thus been necessary to evaluate the instances with a certain degree of autonomy, and this required assigning Smart Product Typologies to every Smart HUMD (instance) that composes a Smart HUMD (system). For instance, the Owlet Smart Sock (Dangerfield et al., 2017) has not been categorized as a system, but rather in its instances, i.e. the sensorized sock, the smart base, and the smart app. Because of this approach, some of the Smart HUMDs (instances) did not perfectly fit into any of the 4 categories of Smart Products. A second reason is that this taxonomy was originally proposed for categorizing "Dumb" Products that become Smart. The parameters adopted by Pardo et al. (2020) for defining product typologies are relative, and not absolute: the parameter that represents the functionalities is indeed defined as "Functional changes".

This detail is critical in this study because it makes it impossible to define those products that started existing to serve their system. For instance, smart applications specifically designed for managing a specific Smart HUMD and accessing its data do not have any "dumb" versions to be compared with. However, they still have to be classified as medical devices. Additionally, another type of product emerged during the analysis of the case studies. It is the case of those products that have enhanced functionalities and are highly interconnected without occupying a central position in the system, e.g. the smart toilet (Bhatia et al., 2020). Due to these issues, the need to adapt the taxonomy proposed by Pardo et al. (2020) emerged. In particular, a new typology of Smart Product called "Smart Extension" (SE) has been conceived to describe the products that started existing only to extend the functions and connectivity of other products in the same system. Moreover, a new typology called "Advanced Node" (AN) could be used to refer to products with advanced features and strong network behavior that are not central in a system, making it necessary to rename the typology "Products-as-a-Node" (PN) as "Simple Node" (SN). Both the PN typology and the PH typology do not seem to represent what can be deemed as AN. Indeed, the KETs distribution across product typologies, as shown in Figure 1, highlights the limitations of these two typologies when it comes to distinguishing between simple and advanced solutions. For instance, the KETs "IoT Networks & Protocols" and "Network Architecture" are concentrated in PN, making distinguishing between simple and advanced systems rather complex. Another example is that the KET "Deep Learning" was misassigned to PN, despite its role in data interpretation and decision-making within smart medical device pipelines.

The new proposed taxonomy of the typologies of Smart HUMDs can be organized as shown in Figure 2b. The "Dumb Product" typology (dp) has been included in the proposed taxonomy for the capability of dumb products to become smart if coupled with SEs, as happens in the case study of the smart nebulizer (Zhou et al., 2018). However, to remark that they are not Smart Products, their acronym is written using letters in lowercase.

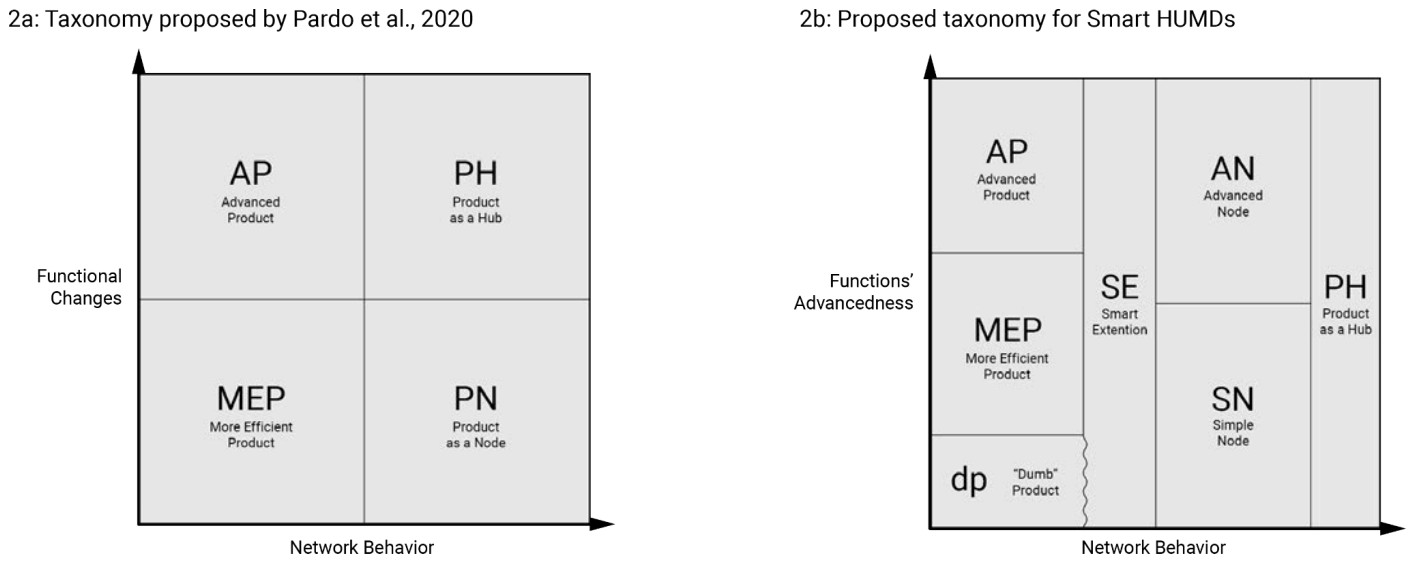

Figure 2. The taxonomy proposed by Pardo et al. (2020) (2a) compared to the taxonomy proposed by this study (2b).

Figure 3 shows the benchmarking of the same case studies built using the proposed taxonomy. The Smart HUMDs (instances) appear more evenly distributed and are more significantly described concerning the advancedness of their functionalities and network behavior. This taxonomy is also meaningful in describing the KETs' capabilities to determine certain levels of functionalities and connectivity. For instance, "Deep Learning" appears only in products with more advanced functionalities, like APs and ANs. At the same time, the KET "Medical Engineering", for the fact that it is also adopted in instances with less technologically-advanced characteristics, emerges as a base, yet fundamental, KET in the definition of a Smart HUMD.

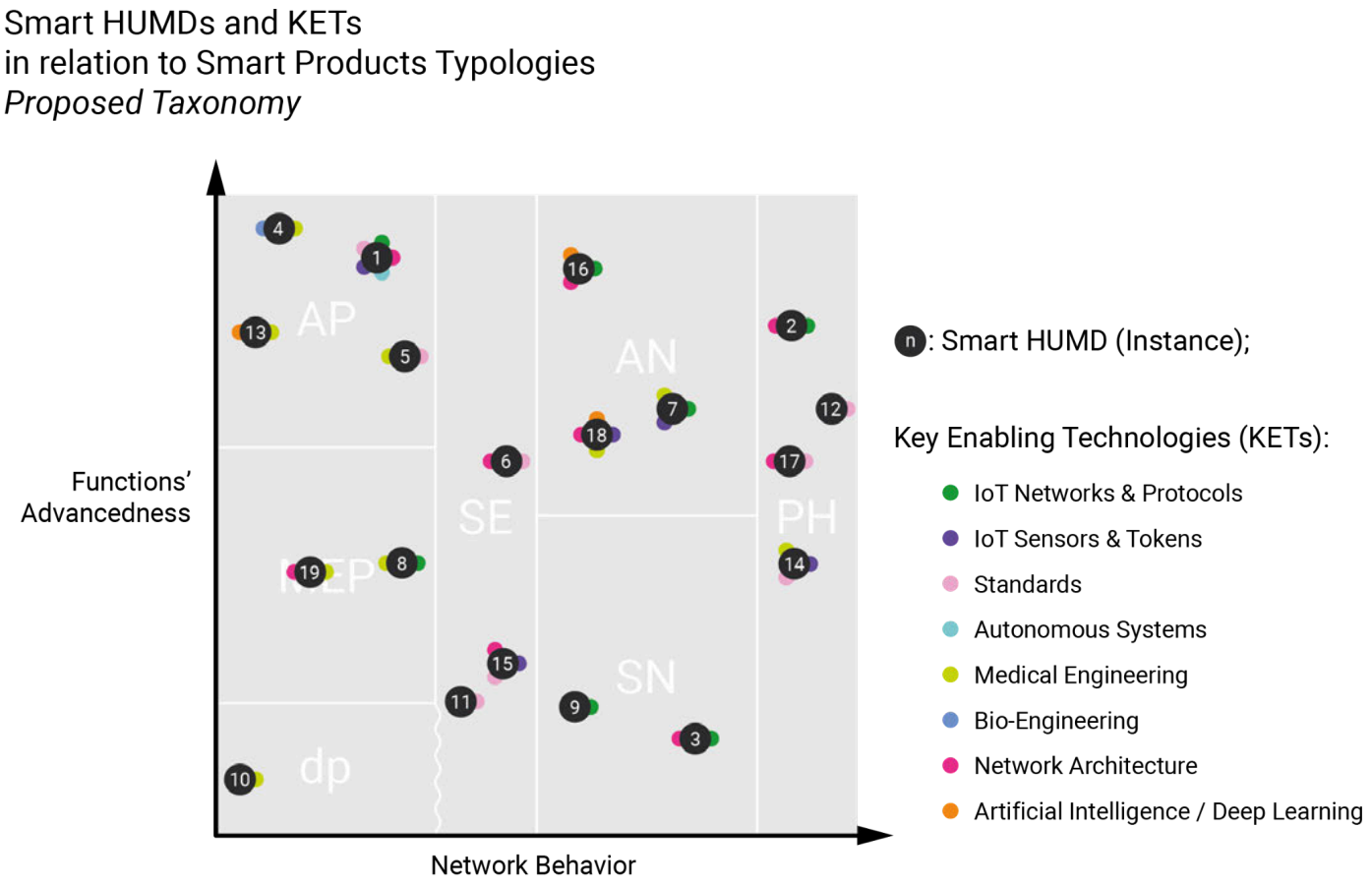

Figure 3. Benchmarking of Smart HUMDs (instances) and KETs in relation to Smart Product Typologies, utilizing the taxonomy proposed in this study.

4. Conclusions and Future Research

This study explored the domain of Smart HUMDs by understanding the relationship between KETs and Smart Product Typologies. The results show that, although the forward-thinking taxonomy provided by Pardo et al. (2020) was successfully adopted in the Smart Business Product domain, it needed to be readapted to describe Smart HUMDs due to factors like regulation, technological involvement, and the taxonomy's aim itself. Thanks to the new taxonomy, it has been possible to map the adoption of KETs in different types of Smart HUMDs, categorizing them into technology-based typologies. Future research could be conducted to evaluate the applicability of the classification model proposed in this study in other Smart Product domains.

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BIOMIMETIC DESIGN AS A FRAMEWORK FOR INNOVATION AND SUSTAINABILITY: Exploring Problem-Based Nature-Inspired Methods in Graphic and Product Design

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ABSTRACT | Design is a plural domain with a notable emphasis on mediation and collaboration where professionals excel through co-creating with experts from diverse areas of knowledge. Thus, expanding the repertoire of resources and creative methods is highly desirable, as it enables designers to explore new experiences and innovative approaches for addressing complex projects that have the potential to contribute to sustainability, ecological awareness, and regeneration. In this context, investigating natural inspiration, namely, biomimicry, is particularly pertinent, as this domain consists of critically and ethically transposing biological analogies to the societal context, drawing inspiration from natural forms, processes, and ecosystems. The present descriptive, exploratory, and experimental investigation was undertaken to identify and analyze the adoption of biomimicry-thinking methods and tools in developing design projects. The Research-Through-Design was oriented by the following methods: a literature review; a parametric analysis of 40 pre-existing bioinspired products; an application of the Biomimicry Thinking Challenge-to-Biology method; brainstorming sessions; the use of a biological concept matrix and SWOT matrix; and multiple experimentations with physical and digital prototypes. These procedures resulted in the development of a bioinspired and dynamic visual identity system, a multisensory installation in Processing and Arduino that allows for

interaction with the brand, and a biomimetic furniture collection. In the parametric evaluation of existing bioinspired products, it was possible to establish relevant criteria for further exploration in biomimetic product design. For the development of the design alternatives (visual identity, interactive system, and furniture design), specific organisms were explored and selected for their structural modular resistance, biomorphic patterns, and compatibility with contextual and sustainable requirements. These inspiring natural elements corresponded to the following set: *Hippocampus reidi*; *Phycodurus eques*; and *Victoria amazonica*. The biomimetic process facilitated extensive experimentation with biological and biomimetic databases, employing various visual representation techniques and prototyping resources. The significance of the interdisciplinary approach for fostering innovation in design was also discussed, with particular emphasis on the contributions of natural knowledge, where specificities and adaptations were tested throughout evolution. The biomimicry resources contributed to integrating sustainable and ecological requirements, organic and biophilic volumetry, and multifunctional elements. Further investigation is recommended on more experiments in design projects applying other biomimetic methods (notably, the Biology-to-Design method) and with different inspiring biological elements in creative sessions, particularly involving design students and professionals. Including biologists as part of the creative team is essential for future experimentation, especially when investigating higher levels of abstraction and complexity, encompassing natural processes and ecosystems. Finally, designers ought to cultivate and exercise interdisciplinary critical thinking as a resource for innovation within their field. Therefore, biomimicry, with its significant potential to stimulate creativity, offers a valuable expansion of the methodological toolbox available to designers. Its integration promotes ecological awareness, stimulates the exploration of complex geometries, and the inclusion of sustainability requirements at the core of design projects. Mastering the ability to interpret and apply insights from natural analogies rooted in biological knowledge is an essential skill for designers aiming to enhance human well-being while fostering harmony with the natural environment.

KEYWORDS | BIOMIMETIC DESIGN, BIOMIMETIC TOOL, BIOMIMICRY THINKING, DESIGN METHOD, SUSTAINABLE DESIGN

1. Introduction

Design encompasses a broad repertoire of methods and tools to address diverse requirements. Adopting new multidisciplinary and exploratory approaches is highly desirable, as it enriches education and professional practice, fostering innovative and context-sensitive solutions (Bonsiepe, 2011; Cardoso, 2016). Examining the designers' associative capacities, by investigating natural analogies and bioinspiration, expands available creative possibilities, supporting sustainable and regenerative projects (Chayaamor-Heil, 2023; MacKinnon et al., 2020; Papanek, 2011).

Biomimicry offers a biologically grounded approach to complex societal and environmental challenges, emphasizing ethical responsibility, and sustainability, ultimately resignifying and fostering reconnection with the biosphere (Delannoy, 2021; Pawlyn, 2011). Through the abstraction of natural forms, processes, and ecosystems, biomimicry enables design activities without the direct exploitation of nature (Cohen & Reich, 2016; Vincent et al., 2006, Arruda, 2018; Chayaamor-Heil, 2023; International Organization for Standardization, 2015). Given the profusion of potentially inspiring natural elements, it is complex to successfully conceive innovative designs, particularly considering the intrinsic higher levels of abstraction within the process (Figure 1) (Aish & Sun, 2020; Graeff et al. 2021). Thus, several resources were developed to support the biomimetic design process (Badarnah, 2012; Vincent et al., 2006; Wanieck et al., 2017).

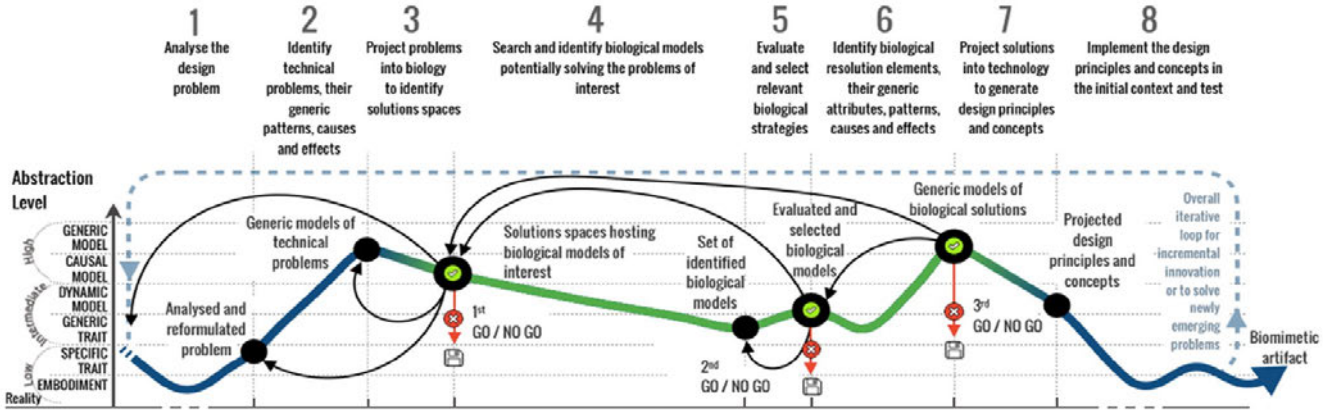

Figure 1. The Technology-Pull-Interdisciplinary-Biomimetic-Process is similar to the Challenge-to-Biology method. It highlights the complexity of transitioning between stages of rising levels in abstraction (Graeff et al., 2021).

Engaging with the biosphere as a knowledge source requires robust ethical alignment, with design outcomes aiming to contribute to human well-being and health. The capacity to integrate biophilic resources, within design education and practice, is increasingly recognized as fundamental (Browning et al., 2024; Pollini & Rognoli, 2024). Biomimicry thus emerges as a strategic approach and investment for creativity, sustainability, and quality of life (Vitalis & Chayaamor-Heil, 2023).

Therefore, the present descriptive, exploratory, and experimental research investigated and analyzed the adoption of the Biomimicry-Thinking Challenge-to-Biology method in design projects. For graphic design, the objective consisted of developing a dynamic brand and an interactive system responsive to light, heat, sound, and presence. The product design project focused on developing nature-inspired modular furniture.

2. Method

A multi-methodological approach was adopted. A literature review and a parametric analysis of 40 pre-existing bioinspired products informed the definition of biomimetic and biophilic design criteria for conducting the Research-Through-Design (Benyus, 2002; Browning et al., 2024; Hanington & Martin, 2019; Sá & Viana, 2023). Then, the application of the Biomimicry-Thinking Challenge-to-Biology approach (Figure 2) allowed orienting the creation of the visual identity, the interactive system, and the furniture design (Biomimicry 3.8, 2025). The Life's Principles Diagram (Figure 3) supported the integration and monitoring of biomimetic and sustainability principles throughout the process (Baumeister et al., 2014). A Matrix of Organisms and Natural Strategies, based on the literature review and the AskNature database, was created to select pertinent biological knowledge (Biomimicry Institute, 2025). Ideation was supported through brainstorming and sketches (Stickdorn & Schneider, 2012). Concepts were evaluated using SWOT matrix analysis. Arduino hardware and Processing software were employed to create the brand design and interactive installation. The product design furniture collection was developed using Fusion 360° software and 3D printing technologies (Hanington & Martin, 2019; Sá, 2018; Stickdorn & Schneider, 2012).

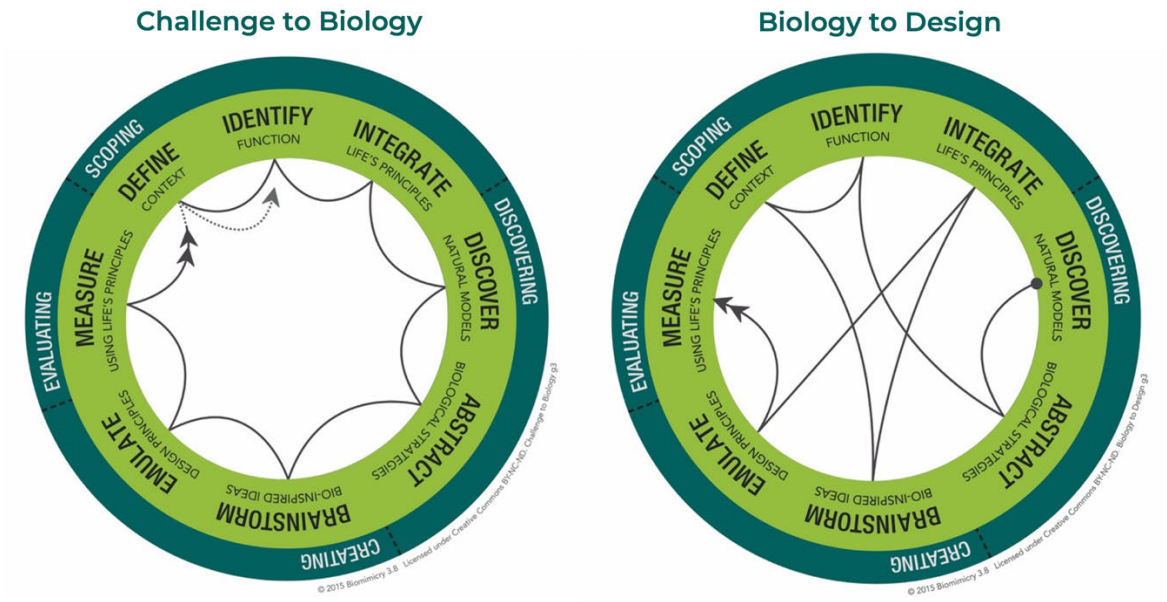

Figure 2. Biomimicry Thinking encompasses two main approaches: Challenge-to-Biology, and Biology-to-Design. The first pathway begins with the formulation of a design brief and the identification of desired functions. Then, the Life's Principles Diagram is applied to guide the search for biological inspiration, whose characteristics are abstracted and translated into conceptual-level design requirements. During prototyping, these emulated biological elements are integrated into design solutions. The final step involves reapplying the Life's Principles Diagram to assess and refine the results, according to biomimetic and sustainable principles. The Biology-to-Design approach follows a similar structure but begins with exploratory biological research that can later be subsequently reframed into viable design projects (Baumeister et al., 2014; Biomimicry 3.8, 2025).

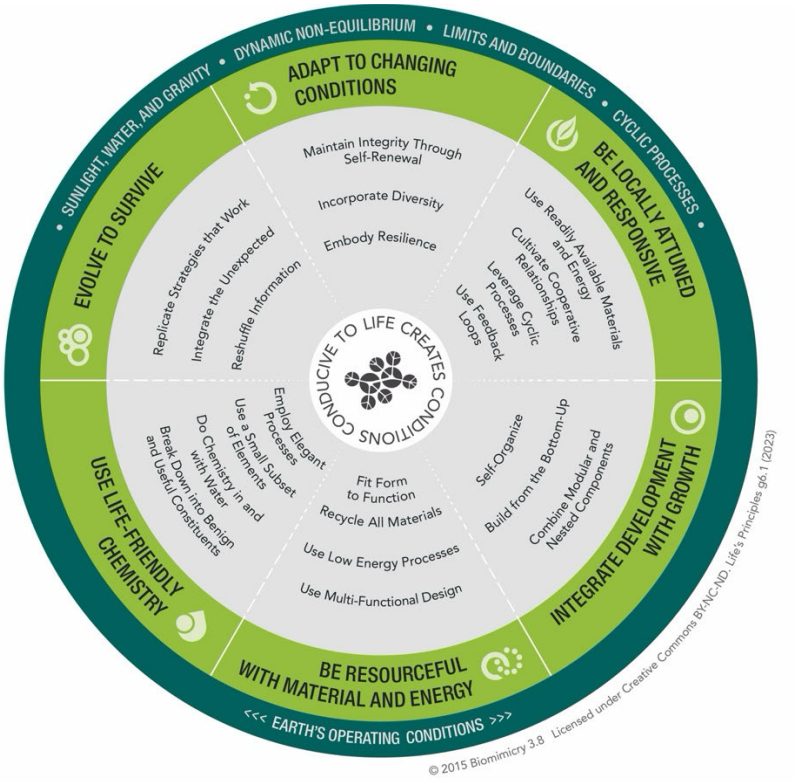

Figure 3. The Life's Principles Diagram is a complementary tool within Biomimicry-Thinking. It provides a set of nature-inspired patterns, that serve as a guiding framework and an evaluation tool for assessing the sustainability and biomimetic relevance of design alternatives throughout the creative process (Baumeister et al., 2014; Biomimicry 3.8, 2025).

3. Results and Discussion

A literature review and a parametric analysis of 40 bioinspired products established the foundation for the multiple design sessions (Sá, 2018; Sá & Viana, 2023). Each product was assessed using four qualitative criteria (biomimicry, biophilia, sustainability, and functionality) and categorized from 0 to 5 (Baumeister et al., 2014; Biomimicry 3.8, 2025; Browning et al., 2024). There was a predominance of biomimicry and functionality, followed by biophilia and sustainability. Probably, the biophilic aspect was considered as "less explored" comparatively to biomimicry, given that only six of its 14 guiding principles could be applied to a single product (Browning et al., 2024).

Guided by Baumeister et al. (2014) approach, the following biologically based guiding design question was set: "How does nature produce modules?". Such question converges with the Life's Principles Diagram, as it emphasizes system optimization and the use of multifunctionality and nested components.

Through searching literature and the AskNature database (Ball, 2016; Delannoy, 2021; Dumont, 2014; Fournier & Fourié, 2011; Thiery & Breton, 2017), and also by applying analytical tools (Biological Concept Matrix and SWOT Matrix), it was possible to select inspiring organisms for biomimetic analogies (Figure 4). The following set was considered the most suitable for the present product and graphic design projects: Hippocampus reidi (long snout seahorse), Victoria amazonica (giant water lily), Phycodurus eques (leafy sea dragon). Brainstorming and sketches supported the elaboration of alternatives and prototypes.

Figure 4. The selection of the multi-biological inspiration set was grounded on specific functional attributes: the seahorse's caudal flexibility enabling multidirectional movement; the structural resilience of the seahorse and leafy sea dragon modular skeletal elements; the giant water lily underside leaf architecture, which supports high load-bearing capacity; and the leafy sea dragon organic forms and appendages, relevant to biophilic design (Box et al., 2022; Browne et al., 2008; Porter & Ravikumar, 2017). Image sources: Clode, 2018; Short et al., 2020; Suguri, 2008; Stiller, et al., 2015; Kutleša, 2024; Taveneaux, 2011.

In the first creative session, a dynamic logo and visual identity system were developed based on biological knowledge (Figure 4). Figurative alternatives were sketched and informed vector-based development and experimentation. Further development was carried out in Processing code language where mathematical functions (e.g., sine and cosine) controlled shape dynamics (Figure 5).

Figure 5. Logo alternatives generated in Processing code, inspired by botanical and marine organisms (Sá, 2018).

By adjusting parameters, the final brand and animation were created (Figure 6). The final alternative was selected for its applicability and for its emphasis on biomimetic and biophilic attributes (including aspects of complexity and order, biomorphic patterns, and modularity). A bioinspired visual identity manual was created to establish guidelines for graphic communication.

Figure 6. The dynamic and animated logo was programmed with a range of parameters correlated to environmental data that could be captured through sensors, allowing it to be "responsive" to variations in: a) luminosity - positive/negative color inversion of the brand; b) temperature and humidity - color and transparency variations; and c) presence and sound intensity - brand animation and speed of motion. Such dynamic reactions were proposed, given the following planned creative session, focused on making an object for a multisensory interactive installation (Sá, 2018).

The second design session resulted in an interactive visual system responsive to environmental stimuli (Figure 7). Changes in form and motion of the graphic components were nature-inspired, and oriented by principles such as adaptability, sensory variability (light and non-rhythmic stimuli), and responsivity to place (Baumeister et al., 2014; Browning et al., 2024). Designed to enhance site-specific engagement, the system mimics biological behavior. Each location of exhibition of the interactive system could have a unique visual configuration. Therefore, the brand would "react" and "adapt" to user presence and environmental conditions to optimize visual configuration, just like an organism seeking the best conditions for survival.

Figure 7. Prototyping was conducted using Arduino-Uno board and Processing code. The set of sensors included: Passive Infrared (PIR) for detecting presence; Light Dependent Resistor (LDR) for recording luminosity; LM393 for extracting sound data; and DHT11 for detecting temperature and humidity. A packaging was designed to protect the hardware (Sá, 2018).

The third session involved the development of a furniture collection inspired by the same organisms (Figure 4). Sketches were followed by prototyping with scale models to study necessary components and mechanisms (Figure 8). A digital prototyping stage was carried out in Fusion 360° to specify furniture modules and test fitting systems. Multiple configurations were proposed, based on different rotations and piece positioning. The resulting designs included module size variations and allowed for vertical and horizontal fittings enabling flexible spatial arrangements, ultimately creating a biophilic ambience (Figure 9).

Figure 8. Concept sketches and 1:8 scale prototypes (Sá, 2018).

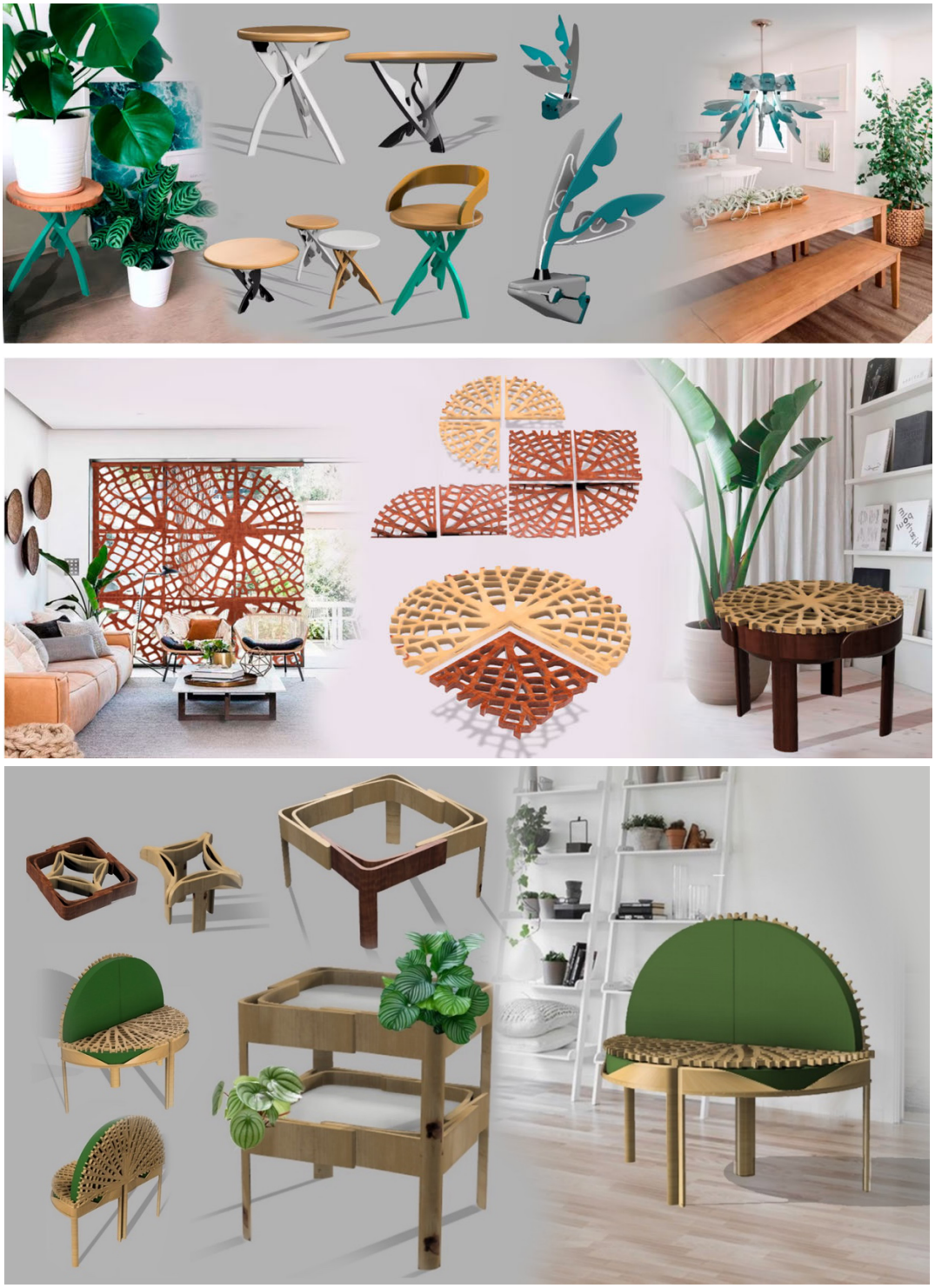

Figure 9. Resulting biomimetic furniture collection: claw lamp and stool inspired by seahorse and leafy sea dragon skeletal structures. Chairs, floor modules, and room dividers based on the giant water lily. Tables and modular shelving units inspired by seahorse tail structure (Sá, 2018).

Each design session addressed different abstraction and complexity levels of biomimicry. The visual identity system was considered highly abstract and predominantly biomorphic, the interactive installation centered on mimicking natural behaviors, requiring further prototyping in different sites to observe how the results differ from place to place. The furniture collection was considered the most robust morphological biomimetic analogy, given that it focused on optimizing functionality in tangible and multifunctional product design. Morphological and structural analogies were predominant, though deeper exploration of micro and nanoscale functions, as well as process and ecosystem level biomimetic analogies, remains a future opportunity. All the design propositions need to be further evaluated according to their real sustainability (LCA, material specifications, supply chain, etc.).

The multiple creative design sessions allowed for experimenting and analyzing the application of the Challenge-to-Biology approach. The results converge with what was emphasized by Andrade et al. (2021); Arruda (2018; 2019) and Myers (2018), that highlight the importance of exploring interdisciplinary knowledge to foster collaboration and innovation in design. Researching within the scientific field and exchanging knowledge with biologists, expands the creative horizons in many different areas of design education and practice and allows for adequately exploring the inspiring vastness of the natural repository where specificities and adaptations were tested throughout evolution.

The Challenge-to-Biology approach facilitated extensive experimentation with the scientific and biomimetic databases which was fundamental for deep understanding of the inspiring organisms. The Life's Principles and the 14 Biophilic Design Patterns (Biomimicry 3.8, 2025; Browning et al., 2024) provided essential frameworks for embedding bioinspired, functional, and ecological aspects across all sessions.

4. Conclusions

The research achieved the proposed objectives, allowing experimentation with biological knowledge and specialized databases, and contributing to analyzing the application the Biomimicry-Thinking Challenge-to-Biology method across diverse design contexts. This approach supported the integration of multi-biological inspiration and sustainable requirements, resulting in multifunctional, biophilic, modular solutions. The findings underscore the designer's pivotal role as a mediator within interdisciplinary teams advancing sustainable, regenerative, and biomimetic practices. Collaboration with biologists is essential for future experimentation, especially engaging with higher abstraction levels and ecological complexity. Conducting biomimetic design projects with different approaches is recommended (e.g., service design, participatory design). Including the application of additional biomimetic methods (e.g., Biology-to-Design, or BioGen) and involving design students and professionals is also pertinent (Badarnah, 2012; Biomimicry 3.8., 2025). Incorporating emerging technologies and quantitatively assessing sustainability criteria of the design developments are also essential aspects for advancing this research (e.g., Life Cycle Analysis).

Ultimately, biomimicry significantly contributes to design education and practice by fostering creativity, stimulating engagement with complex systems and geometries, and broadening ecologically responsible design solutions. Mastering the ability to design from biological analogies is vital for enhancing well-being while cultivating harmonious, symbiotic co-existence with the natural environment (Blanco et al., 2021; Chayaamor-Heil et al., 2024; Zari & Hecht, 2020).

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COEXISTENCE DESIGN. BRIDGING PUBLIC ADMINISTRATION AND VULNERABLE COMMUNITIES.

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ABSTRACT | Public Administration (PA) services often fail to meet the needs of marginalized communities due to systemic barriers and standardized service models that overlook diversity. This research proposes a value-oriented and participatory approach to service design, aimed at fostering "coexistive services" that accommodate a plurality of needs rather than striving for mere inclusion. Grounded in theories of intersectionality, Design Justice, and Value-Sensitive Design, the study introduces a three-phase methodology. The first phase focuses on identifying communication frictions between PA, service providers, and vulnerable users. Fieldwork currently underway explores these dynamics through stakeholder interviews and field observation. The second phase will involve participatory co-design workshops to prototype tools and interventions that improve mutual understanding and accessibility. The third phase shifts to a systemic level, examining how institutional structures within PA can be reoriented to support equitable and responsive service delivery. Preliminary findings reveal both the potential of relational pedagogical practices and the limitations of current institutional communication, particularly in decision-making and inter-organizational collaboration. The outcome of the research will include a heat map of stakeholder frictions, a participatory design toolkit, and strategic policy recommendations. Ultimately, this study advocates for a structural transformation in PA by embedding design practices that promote equity, accessibility, and the coexistence of differences within public service ecosystems.

KEYWORDS | INTERSECTIONALITY, SERVICE DESIGN, PARTICIPATORY DESIGN, PUBLIC SERVICE INNOVATION

1. Introduction

The present Western society model results from centuries of colonialism, capitalism, Eurocentrism, heteronormativity, and androcentrism, heavily pushing a binary view of individuals. Today, as attentive members of society, we can discern the discriminations across public and social sphere, mainly brought to light by activist movements such as transfeminism, Black right, Indigenous rights, and Disability rights groups, LGBTQIA+ organizations, and many others. Nevertheless, the concept of intersectionality of these discriminations is often ignored.
Intersectionality refers to the overlapping of oppressions, such as race and gender, or sexuality and nationality (Crenshaw, 1991). Academic and sociologist Patricia Hill Collins' Matrix of domination offers a representation of this phenomenon, highlighting how "structural, disciplinary, hegemonic, and interpersonal domains of power reappear across quite different forms of oppression" (Collins, 1990, p.228), reinforcing inequalities.
Recognizing intersectionality necessitates questioning societal norms and the perception of what—or rather who—is "other" and why it is different from the standard. And, above all, why is there a standard? As linguist and activist Vera Gheno (2023) argues, inclusion should not represent the goal of society but rather the first step to equity. Instead of a paternalistic act by a dominant group to "include", we should embrace Acanfora's (2021) concept of "coexistence of differences", which differs from coexistence with differences. For this reason, we should not speak of inclusive but rather of broad approach, vision, and language (Acanfora, 2021).
Public Administration (PA) often neglects these perspectives, failing to distribute attention and resources equitably. This research argues that public services must shift from a one-size-fits-all model to an equity-driven approach that redistributes the "attention economy" (Davenport & Beck, 2001) to marginalized communities.

2. Scientific Framework: Design as a Tool for Institutional Transformation

In this social and cultural context, institutions and therefore public services are mainly designed with an implicit assumption that the average user is male, wealthy, local (urbanized), cis-straight, atheist or follower of the main religion, unburdened by domestic labor.
Why is this conception so clearly biased and yet so diffused, the standard? Centuries of patriarchal vision have led, among other things, to a flawed collection of statistical aggregated data, erasing marginalized identities. The "anomaly" is excluded because of the risk of fallacy (Criado Perez, 2019). The result is a great discrepancy between the services offered and the needs of marginalized groups, which often represent a large part of the population that must face systemic and systematic barriers to achieve the same rights as the above-mentioned standard-user. These barriers, compounded by systemic inequities, can have psychological and physical repercussions, as illustrated by Meyers' Minority Stress Model (2003).
Concerning the PA, vulnerable citizens and marginalized communities often face significant barriers and exclusion in accessing and using services. Activists have long argued that inaccessible environments, such as workplaces without childcare and buildings without ramps, make oppressed people less visible and, therefore, less likely to receive legislative protections (Steinfeld and Maisel, 2012).
PA systems, much like other aspects of the built and social environment, are too often

designed with a one-size-fits-all approach. This overlooks the unique experiences of individuals with disabilities, non-normative identities, or socioeconomic disadvantages, leading to systemic exclusion and marginalization.
This context sets the stage for exploring how Design can challenge and reshape these inequities. To do so, it is necessary to inquire about who historically and typically participates in design processes and, thus, what is the relationship between design and power (Braman, 2020; Costanza-Chock, 2020). As Winner (2009) notes, “artifacts have politics," and Design is inherently tied to power structures, playing a critical role in shaping societal norms and dynamics. This highlights the need to examine the diversity, inclusivity, and equity of design practices from the beginning of the process, as they can have a very direct influence on the technologies, methods, and context of the project (Grönvall and Lundberg, 2022).
In the digital environment, this connection becomes even more pronounced. Designers work in a "sociotechnical" world, where the “code is law,” and provide an infrastructure of constraints and affordances that shape processes and perceptions (Braman, 2020). For example, security full-body scanners force operators to select M/F options, creating discrimination and barriers for queer, trans*, intersex, and gender non-conforming people, posing barriers for disabled people with non-normative body shapes and/or prostheses as well (Costanza-Chock, 2020). Similarly, biases are presented against Sikh men, Muslim women, and individuals wearing headwraps (Browne, 2015), as machines are trained through “lenses tinted by the optics of white supremacy” (Buolamwini, 2017). Such cases demonstrate how norms and values embedded in sociotechnical systems reproduce biases structured by the Matrix of Domination, further marginalizing vulnerable communities. Ensuring design justice in PA systems requires innovation on both the technical and the social side, through the development of new communal formations and processes (Braman, 2020). Addressing the systemic barriers faced by vulnerable citizens calls for a focus on equity-driven, Diverse, Equitable, Inclusive (DEI) design approaches.

3. Research Approach: Designing for Coexistive Public Services

3.1. Scientific Objectives of the Research

The research aims to address the systemic barriers and exclusion faced by vulnerable communities in accessing and using PA services. It builds on DEI principles and frameworks such as Design Justice, Value Sensitive Design, and Participatory Design (Costanza-Chock, 2020; Flanagan et al, 2008; Friedman et al., 2013; Simonsen & Robertson, 2013) to challenge these inequities by reshaping service delivery to be equitable and promoting a plurality of values among the stakeholders (Grönvall et al., 2016).
The general objective of the research is to assist the PA in the provision of “Coexistive Services”, intersectional and equitably accessible to all users regardless of their vulnerability.
The study contributes to two key areas:

1. On an analytical and operational level, the research observes the relations among stakeholders and designs targeted interventions, by focusing on where the friction happens (SO1) and how to intervene through participatory practices of service design (SO2).
2. On a strategic and systemic level, it asks how the PA can enable a new way of doing public service, wondering how the system itself (the PA) can evolve to accommodate plurality of needs and visions and design services for the coexistence of differences.

3.2. Methodology and Phases

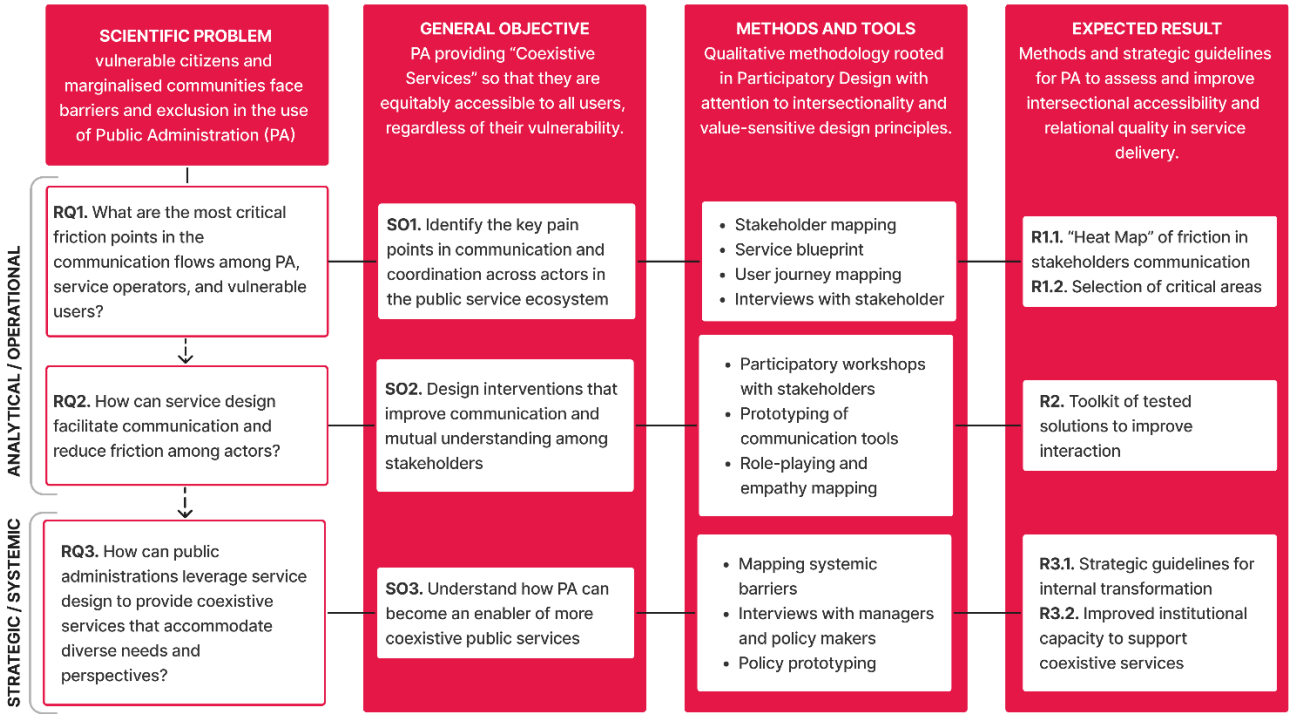

Figure 1. The research is divided into three phases, each stemming from a research question, posing a specific objective and aiming at one or more expected results. The first two phases contribute to an analytical/operational level of the research; the third phase constitutes a strategic/systemic level.

The research methodology, as shown in Fig.1, is divided into three phases that start from a research question (RQ) to achieve a specific objective (SO) thanks to the expected results (R).

1. Asking "What are the most critical friction points in the communication flows among PA, service operators, and vulnerable users?" (RQ1), the first phase aims to identify key pain points in communication and coordination across actors in the public service ecosystem (SO1). The analysis of the relations through stakeholders maps, interviews with stakeholders and customers journey maps, will define a "heat map" of frictions in the stakeholder communication (R1.1), allowing to select the most appropriate area of intervention (R1.2).
2. To design interventions that improve communication and mutual understanding among stakeholders (SO2), phase two inquires on "how can service design facilitate communication and reduce friction among actors?" (RQ2). The results of tools such as participatory workshops with stakeholders, prototypes of communication tools and empathy maps from role-playing, will produce a toolkit of tested solutions to improve the interactions (R2).
3. Finally, on a wider systemic level, the third phase inquires on "how can PA leverage service design to provide coexistive services that accommodate diverse needs and perspective?" (RQ3). To understand how PA can become an enabler of more intersectional services (SO3), tools such as map of systemic barriers, interviews with managers and policy makers, and policy prototyping, will provide a set of strategic guidelines for internal transformation (R3.1) to improve institutional capacity to support coexistive services (R3.2).

4. Exploring Service Relations in a Danish PA Context

At the time of writing this short paper, a visiting research period is ongoing at the IT University in Copenhagen, hosted by Prof. Grönvall, to acquire best practices and insights on Participatory Design and local inclusive initiatives. In this context, desk research has

been conducted to identify public organizations working with vulnerable users, vocational schools offering programs in social work and PA, and local administrations operating in the areas of social housing and health and care.
To date, an interview has been conducted with a social worker at the Elmehuset facility. Provided by the Municipality of Copenhagen, it is a residential and temporary accommodation institution dedicated to children and young people with autism spectrum disorders. During the visit, it emerged that the residents have constant access to the support of pedagogical social workers. In addition to housing, meals are provided in common dining rooms, along with community activities aimed at promoting social interaction. The goal of the facility is to make residents autonomous in preparation for moving into their own housing, through the assessment of Activities of Daily Living (ADL). These are activities that people engage in on a routine basis, such as brushing their teeth and preparing a meal, and are associated with better outcomes in independent living, education, employment, relationships, and mental health (Krempley & Schmidt 2021).
It was learned that the relationship between social workers and young residents is daily and relatively egalitarian: there is no power imbalance imposed by the staff, and the young people are encouraged to participate in activities on a voluntary basis, without pressure or obligation. When asked about the residents' involvement in the facility's decision-making, for example, concerning the weekly menu or collective activities, it emerged that while the young people are invited to participate in meetings, in practice very few attend.
On the medical-administrative side, each resident has a medical file compiled by the clinical staff at the time of admission, and a specific program to follow for rehabilitation or health maintenance. The facility itself does not maintain relationships with similar organizations but hosts internships from pedagogical programs to train future social workers.
On the relational level, some insights emerged from the visit to Elmehuset:

- Service workers and residents: communication between vulnerable users and service workers is direct; for the pedagogues, "the aim is to create a relation to the kids and the youth who lives here, […] to do relational work." However, the young residents tend to participate little in the meetings proposed by the staff. Internal communication within the facility also takes place via a software system indicating the daily and weekly menu, staff shifts, planned activities, etc.
- Service workers and administration: the facility does not communicate with other similar organizations and mainly refers to health and care institutions regarding the residents' conditions. In this case too, communication takes place primarily through forms and digital platforms.
- Administration and vulnerable users: no insights emerged on this point.

It should be noted that the interview took place during an early stage of familiarization with the facility, when the research focus on relationships had not yet been established, and thus the information emerged from questions of a different nature.

5. Conclusion: Institutional Pathways to Equity

The research is currently in Phase One, which focuses on mapping the friction points among PA, service operators, and vulnerable users. This stage involves interviews with stakeholders from public institutions, vocational schools, service providers for vulnerable people, and the users themselves. Initial fieldwork conducted in Copenhagen through desk research and a preliminary interview with a social worker at Elmehuset, has highlighted the relational dynamics within an inclusive public care structure. While the staff's pedagogical methods demonstrate a commitment to fostering egalitarian interactions, gaps in participatory decision-making and institutional communication emerged, offering valuable insights into existing limitations.
The next steps involve applying the same methodological framework in a second

European country and in Italy. This comparative approach aims to generate a broader understanding of the state of PA across diverse contexts, ultimately resulting in a "Heat Map" of communication frictions (R1.1) and the identification of critical areas for intervention (R1.2). These insights will form the basis for co-designing participatory solutions in Phase Two (R2), and later developing strategic guidelines for institutional change in Phase Three (R3).

This research begins from a core societal challenge: the persistent exclusion of marginalized communities from equitable access to PA services. These systems are still predominantly designed for a normative user profile, thus systematically excluding those whose needs fall outside the "standard". Through a conceptual shift from inclusion to coexistence of differences, the study builds on DEI principles, Participatory Design, and Design Justice frameworks to redefine how PA services are conceived and delivered. The three-phase methodology provides both analytical and systemic insights. By mapping communication breakdowns, developing participatory toolkits, and co-creating institutional strategies, the research lays the foundation for PA systems to embrace a plurality of values and needs.

Ultimately, this research advocates for a new paradigm of "coexistive services" that are not only accessible but also affirm the agency and dignity of all users. By embedding participatory and value-sensitive design practices into the DNA of public institutions, this project contributes to a more equitable, inclusive, and socially just future for Public Administration.

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CONTROVERSO: A DIGITAL EDUCATIONAL MODEL FOR TRANSMITTING HISTORICAL MEMORY AND CONTROVERSIAL HERITAGE IN CIVIC EDUCATION

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ABSTRACT | Historical memory is essential in forming both individual and collective identities, serving not only as a means to recall the past but also as an active resource for interpreting the present and shaping the future (Halbwachs, 1992; Jedlowski, 2000). Traditional civic education has historically emphasized the transmission of knowledge, and there is an increasing emphasis on incorporating interactive methods to foster critical engagement and reflective discussion. In response to this evolving perspective, the ControVerso project emerges as an innovative digital educational system that integrates the concepts of historical memory and controversial heritage within civic education.

Drawing on landmark research in memory studies—including works by Halbwachs (1992), Assmann (2011), and Ricoeur (2004)—the project is grounded in the idea that memory is a dynamic process influenced by social contexts and collective experiences. Moreover, contemporary investigations have underscored the potential of controversial heritage—those aspects of history that generate debate and divergence—as a catalyst for critical discussion (Delgado-Algarra & Estepa-Giménez, 2016). By embedding these theoretical insights within a practical framework, ControVerso aims to transcend conventional pedagogical models through active, student-centered learning.

The methodology is structured in three phases. First, the normative and theoretical context of civic education in Italy is examined, tracing its evolution from the introduction of D.P.R. no. 585 in 1958 to the guidelines established by Law no. 92/2019. Second, the project operationalizes these concepts by focusing on the Italian Resistance; testimonies sourced from *NOI Partigiani. Memoriale della Resistenza italiana* (2020) are qualitatively

analyzed and integrated into a narrative module that emphasizes the role of controversial heritage in promoting critical reflection. Third, a pilot simulation was conducted with 16 students, during which both qualitative and quantitative data were collected through anonymous questionnaires to assess levels of involvement.

Preliminary findings indicate that the ControVerso platform effectively engages students, prompting a range of emotional and reflective responses, and supports the hypothesis that digital pedagogical tools can enrich civic education. These results provide a promising foundation for further research and broader implementation within classroom settings, with potential benefits including increased student participation, improved critical analysis, and a more profound understanding of history's complexities.

KEYWORDS | HISTORICAL MEMORY, CONTROVERSIAL HERITAGE, CIVIC EDUCATION, CRITICAL THINKING, INTERACTIVE LEARNING

1. Introduction

Historical memory plays a crucial role in shaping both individual and collective identity, serving not only as a recollection of the past but also as an active resource for understanding the present and planning for the future (Halbwachs, 2007; Jedlowski, 2000). In recent decades, the so-called memory studies have demonstrated that memory is not merely a passive record of events; rather, it is a dynamic process laden with emotional and political significance that contributes to forming the social and cultural fabric of a community (Jedlowski, 2000). In this context, the ability to develop a critical memory becomes fundamental to fostering informed citizenship and critical thinking—elements that are indispensable in a rapidly changing society.

Civic education and the cultivation of critical thinking represent relevant challenges for the contemporary educational system, especially in an era when historical narratives and information can be easily distorted or manipulated. Traditionally, the teaching of history has favored a linear, often one-way transmission of knowledge, leaving little room for active discussion and critical reflection among students. However, innovative pedagogical methodologies—such as cooperative learning, debate, flipped classroom and situated learning—offer new perspectives for engaging students in a process of shared knowledge construction (Paul & Elder, 2019).

In response to these needs, ControVerso emerges as an integrated educational system designed to connect historical events, personal experiences, and contemporary issues through an interactive digital platform. The system aspires to stimulate discussion and dialogue among students, promote critical reflection on historical and cultural content, and thereby foster the development of essential competencies for civic education. In particular, ControVerso seeks to overcome the traditional "teacher-knowledge-learning" model by embracing a student-centered methodology that prioritizes active participation and problem solving (Castoldi, 2011).

This paper aims to present ControVerso and its experimental implementation. First, the theoretical framework supporting the importance of historical memory and controversial heritage as tools for developing critical awareness will be examined. Next, the methodology adopted for designing the system will be described, highlighting the development phases, the pedagogical techniques employed, and the validation process

conducted through a simulation. Finally, the preliminary results and the implications of the project will be discussed in light of the current challenges in civic education and the development of critical thinking.

The central question guiding this study is: how can the use of digital tools and active pedagogical methodologies foster the transmission of historical memory and the development of critical thinking among students? In response to this inquiry, the paper intends to offer a critical reflection on the potential and limitations of an innovative educational approach, providing insights for future applications and further research in the field.

2. Theoretical Framework

Memory represents a dynamic process that transcends the mere recording of past events, shaping meanings and influencing the construction of both individual and collective identities (Halbwachs, 1992; Assmann, 2011). It operates through empathy, connecting individuals and facilitating recognition of the emotional, social, and cultural dimensions inherent to human experiences (Connerton, 1989). Historical memory specifically plays a crucial role, encompassing events not necessarily directly experienced but integral to the shared heritage of communities (Ricoeur, 2004; Olick & Robbins, 1998).

Within memory studies, an important theoretical discourse revolves around the tension between objective historiography and subjective memory. While historiography seeks to establish objective truth through rigorous source analysis, memory inherently responds to subjective and identity-oriented needs. This tension highlights memory's role in identity formation, emphasizing the significance of personal and collective roots, culturally and socially mediated. The historian Hobsbawm (2014) warns of the dangers associated with the loss of a meaningful connection to the past, as this can trap younger generations in a continuous present, severed from their historical awareness.

Collective memory further illustrates the interplay between individual experiences and social contexts. Halbwachs (1992) demonstrated that individual recollection is profoundly influenced by collective narratives, shaping experiences and forging communal identities. Collective memory, therefore, emerges not merely as an aggregate of individual memories but as a socially mediated construct that solidifies communal bonds and shared identities (Olick & Robbins, 1998).

Another critical aspect of memory studies involves controversial heritage, referring to historical elements that provoke debate and divergence. The selective nature of memory—what is remembered or forgotten—is a deliberate and often contentious choice with significant educational implications. Recent paradigms proposed by Delgado-Algarra and Estepa-Giménez (2016) underscore controversial heritage's educational value in fostering critical reflection. Addressing controversial heritage in educational settings encourages learners to move beyond passive recollection towards active, autonomous, and critical engagement with historical narratives.

The pedagogical integration of historical memory aligns closely with contemporary educational imperatives, particularly the cultivation of critical thinking and civic competencies. Historical memory, serving as a carrier of shared meanings and values, can be strategically utilized in civic education to foster active participation and informed

debate on historical and contemporary issues. Critical thinking, widely recognized as a key competency for the twenty-first century (World Economic Forum, 2015), involves analyzing, evaluating, and reconstructing information to draw informed conclusions. Paul and Elder (2019) describe critical thinking as essential for fostering reflective judgment, motivating problem-solving, and enabling independent interpretation of historical contexts to shape informed decisions for the future.

Thus, integrating historical memory and controversial heritage into civic education emerges as a powerful methodological approach to stimulate critical awareness, facilitate reflective engagement, and support the formation of conscientious citizens capable of navigating complex historical and social landscapes.

3. Methodology

The methodological framework of this research is structured around a comprehensive desk research approach, intended to create a robust foundation for the development of the ControVerso digital educational model. Initially, an extensive literature review was conducted to understand theoretical principles underlying historical memory, controversial heritage, and their role in civic education.

This review was supplemented by an in-depth analysis of the legislative and normative frameworks governing civic education in Italy.
Civic education in Italy has historically played a transversal role, although it has often been relegated to a marginal subject—commonly referred to as the "Cinderella subject." Since 1958, the year in which D.P.R. no. 585 introduced civic education in middle and high schools, up to the provisions of Law no. 92/2019, the goal has consistently been to form informed and critical citizens.
The guidelines set forth by Law no. 92/2019 are based on three pillars:

- The Constitution, law (both national and international), legality, and solidarity;
- Active and digital citizenship;
- Sustainable development, environmental education, and the knowledge and protection of heritage and territory.

Given the research's innovative nature, it was considered essential to incorporate a divergent analytical phase to establish a broader reference framework. Thus, a targeted desk research on existing digital platforms for participatory processes and civic engagement was carried out. This analysis explored systems not strictly related to educational contexts but relevant due to their methodological and operational insights, specifically examining platforms such as SessionLab (in collaboration with the International Association of Facilitators - IAF), Participedia, CitizenLab, Consul, and Pol.is. Although these platforms focus on diverse thematic areas, their analysis provided valuable insights regarding the participatory mechanics, digital interaction techniques, and operational methodologies applicable to the ControVerso project.

Building on these methodological insights and to concretely apply theoretical concepts to a controversial historical context, the research focused on the Italian Resistance as a pivotal case study. The complexity and controversial nature of the Resistance's collective memory made it particularly suitable as an educational resource for fostering critical debate among students. The primary source used was *NOI Partigiani. Memoriale della Resistenza italiana* (Lerner & Gnocchi, 2020). The testimonies contained therein were archived and qualitatively analyzed, revealing many common points regarding

interpersonal dynamics, shared emotions, and the challenges of decision-making in crisis situations. These elements were then interwoven into a common narrative that serves as the foundation for the educational module.

Finally, the developed model underwent a pilot validation phase aimed at assessing student engagement and the effectiveness of the interactive approach.
A simulation was conducted with a group of 16 students aged between 12 and 15, belonging to the AGESCI Roma70 scout group. Due to bureaucratic constraints, a classroom-based implementation was temporarily unavailable, and thus this preliminary pilot provided essential qualitative and quantitative feedback through anonymous questionnaires. The team consisted of the author and a psychologist, supported by the scout group's staff and the overall activity lasted approximately 40 minutes.

In summary, this methodological approach aimed at building a solid theoretical and operational structure by blending traditional literature review, normative context analysis, and insights derived from relevant participatory digital platforms, thereby offering both robustness and practical relevance to the ControVerso digital educational model.

4. The ControVerso project

The ControVerso digital educational system represents a concrete application of the theoretical and methodological insights outlined in previous chapters. At the core of this initiative is the integration of active learning methodologies—such as cooperative learning, debate, flipped classroom, and situated learning—selected for their effectiveness in stimulating critical thought, problem-solving skills, and interactive participation (Galofaro & Cagol, 2021). ControVerso thus embodies a student-centered educational approach, emphasizing the collaborative exploration of complex societal and historical issues.

Specifically, ControVerso aims to actively engage students in reflective processes regarding controversial historical heritage, fostering their capacity to critically analyze and discuss sensitive topics. By connecting personal experiences, historical testimonies, and contemporary issues, the platform seeks to bridge the gap between classroom contexts and broader societal realities, facilitating meaningful dialogue and collective reflection. Furthermore, the initiative aims to support teachers in managing civic education hours effectively, ensuring active student participation and the transmission of historical memory as a cornerstone for civic awareness.

Operationally, the ControVerso system is implemented through an interactive digital platform designed specifically for classroom use and compatible with interactive whiteboards. The platform organizes students into working groups, illustrates the rules of the activities, initiates the educational sessions (Figure 1), and manages the narrative timeline and interactions among participants.

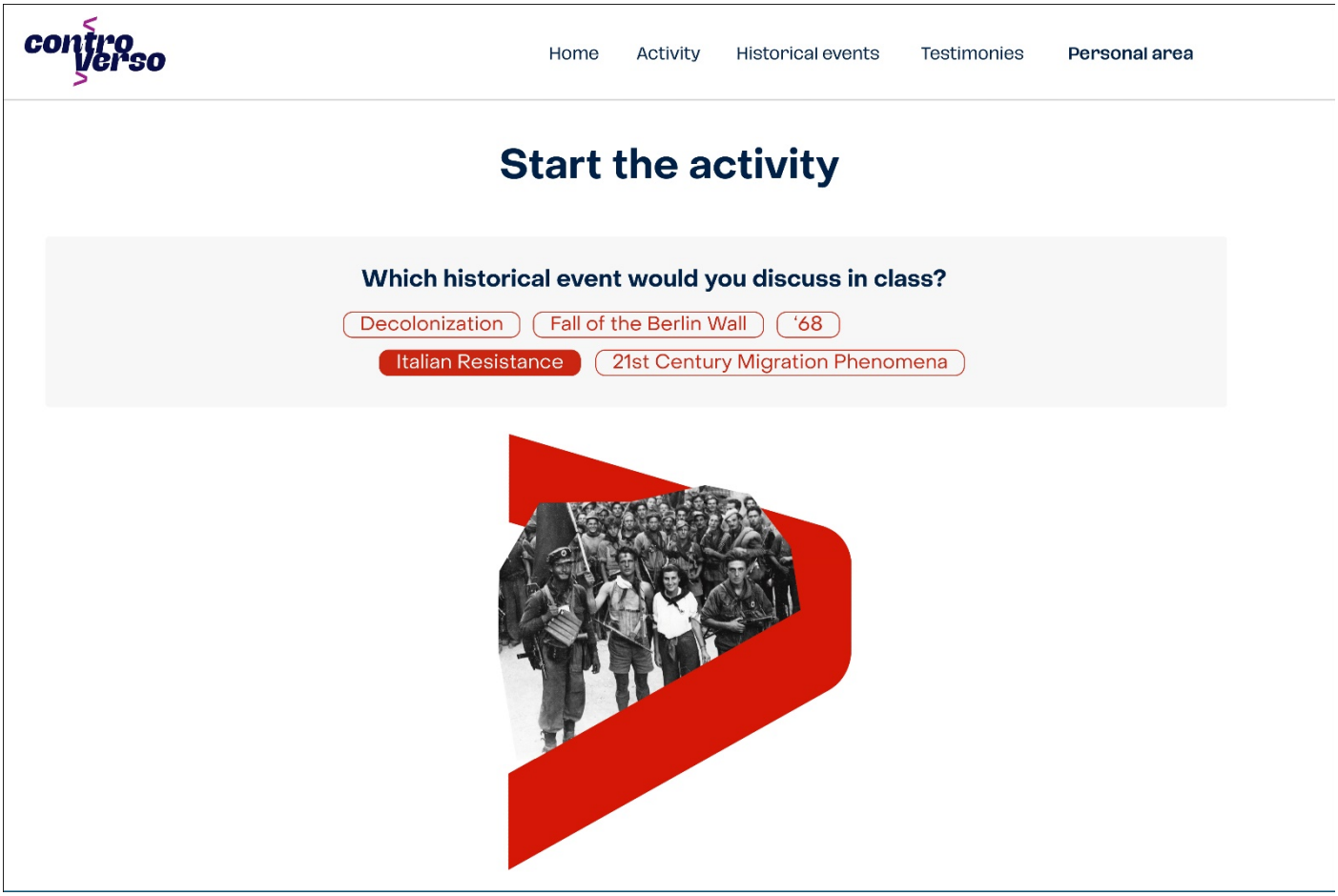

Figure 1. Start the activity.

The core component of the project consists of authentic testimonies, collected, categorized, and integrated into a structured narrative flow. These real stories intertwine to create a cohesive and meaningful narrative experience. The graphic stories are structured with branching points, where the active participation of students, previously divided into groups by the "headmaster" platform, comes into play. The questions and ensuing choices determine a change of character in the narrative, and the story continues accordingly (Figure 2).

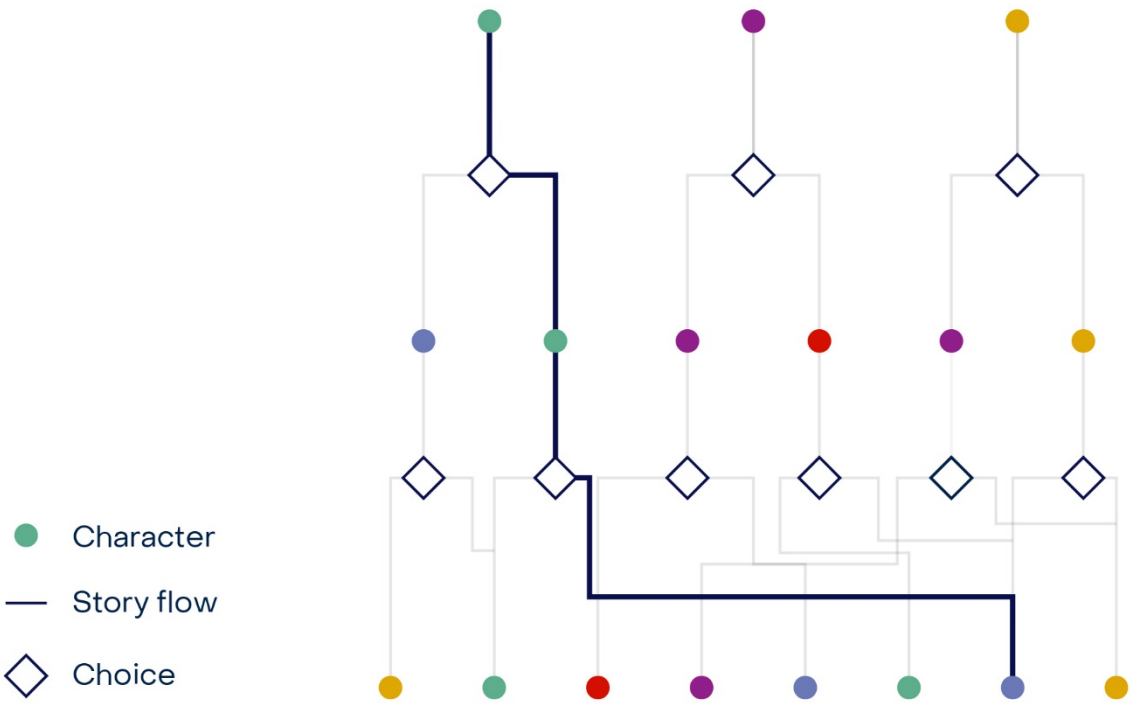

Figure 2. Story structure.

At various points in the storytelling process, the students encounter critical "crossroads"—situations presenting dilemmas that require thoughtful deliberation and collaborative decision-making. This binary choice structure initiates dynamic discussions within groups, prompting students to carefully evaluate historical contexts, narrative scenarios, and character motivations, thus actively shaping the continuation of the story (Figure 3).

Figure 3. Crossroads choice.

In a second phase, linked thematically to the previous dilemma, the platform invites students to engage in further reflection. At this stage, the narrative shifts from external historical scenarios to introspective contexts closer to students' own experiences. This reflective exercise, identified as the "In your shoes" phase, encourages learners to articulate their thoughts and emotions, fostering empathetic understanding and critical reflection on the controversial themes explored (Figure 4).

Figure 4. "In your shoes" analysis.

At the conclusion of the interactive session, the platform provides additional resources and materials for further exploration of individual testimonies and their broader historical context, enabling deeper inquiry and ongoing reflection beyond the immediate activity (Figure 5). Additionally, the platform features a dedicated teacher's personal area, allowing educators to select specific historical events and thematic areas of interest, and directly connect them with external associations actively involved in collecting testimonies and promoting historical memory (Figure 6).

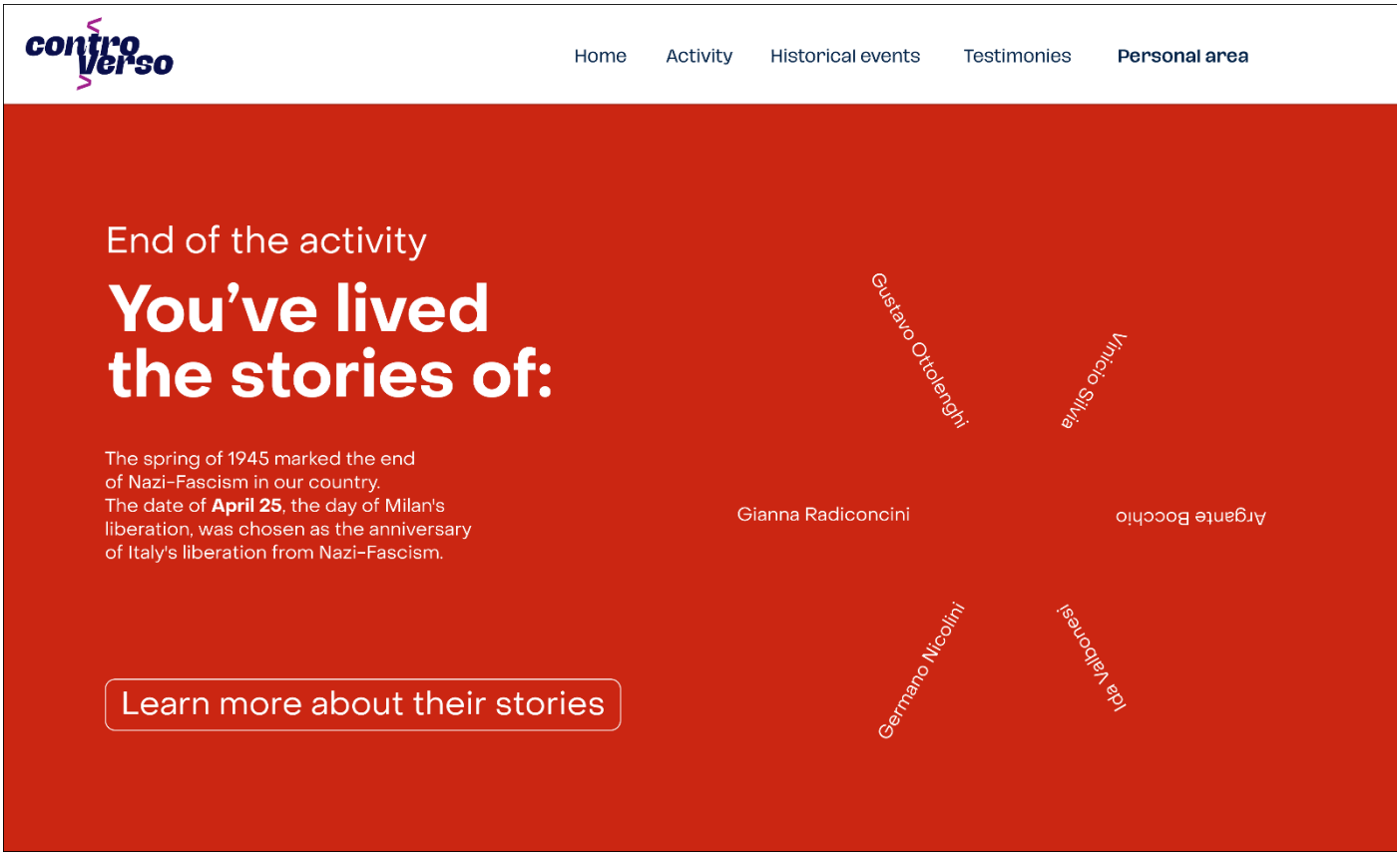

Figure 5. End of the activity.

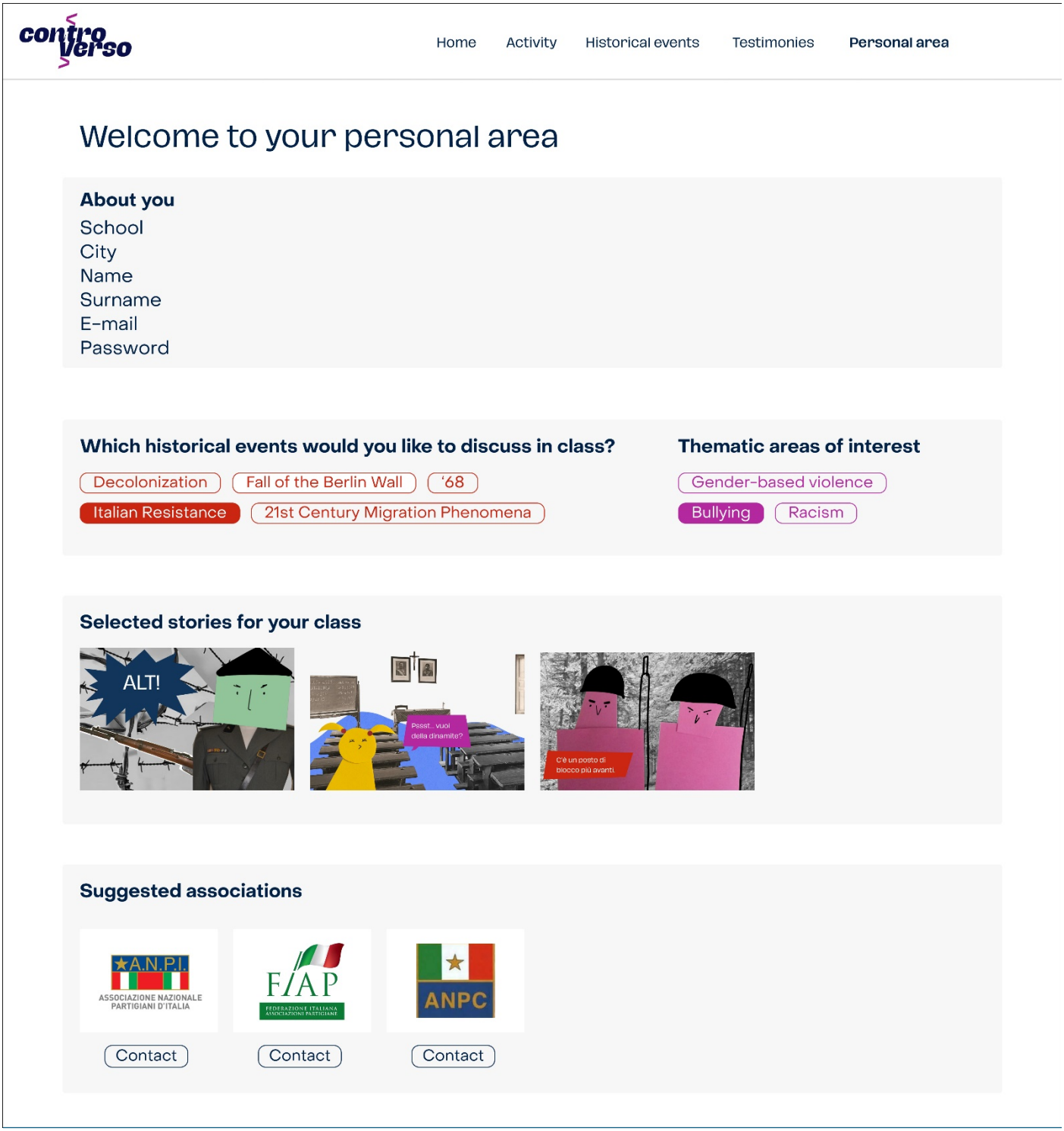

Figure 6. Personal area.

In conclusion, the ControVerso platform embodies an innovative approach to addressing contemporary challenges in civic education. By leveraging digital interactivity and participatory storytelling methods, it represents a practical and experimental effort to cultivate informed, critically aware, and socially engaged students. Furthermore, it provides operational insights into the potential of integrating digital pedagogical tools within existing civic education curricula.

5. Results and conclusions

At the end of the activity, students completed an anonymous questionnaire that included both closed and open-ended questions. From a quantitative perspective, preliminary feedback from students was broadly positive, with the majority indicating that the activity was engaging, stimulating, and conducive to free and open discussions. Most students expressed a strong interest in repeating similar experiences in classroom settings.

The qualitative feedback offers insight into the emotional and cognitive impact of the experience. When asked to indicate an emotion elicited by the activity, students mentioned responses such as “a bit of depression,” “empathy,” “fun,” “reflection,” “adrenaline,” and “a sense of peace.” In response to the prompt, “If you liked this activity, explain why,” some students stated that it “made them think about historical events they already knew from a different perspective,” that it allowed them “to socialize with peers they had not met before,” and that it provided an opportunity to “freely express their opinions.” Additionally, when asked if there were other topics that could be discussed in class, answers included suggestions like “the environment,” “all topics,” “the 21st century in general,” and “violence against women.”

These preliminary results suggest that the interactive platform successfully engages students and stimulates a range of emotional and reflective responses. The feedback indicates that the project not only fosters critical thinking and social interaction but also encourages students to reconsider historical narratives from new perspectives. This supports the hypothesis that innovative digital pedagogical tools can play a significant role in enhancing civic education. However, there is a need for further testing within an actual school setting—specifically, in a middle school classroom. Future implementations should ideally include the presence of a historical witness or expert on the event discussed, to deepen the subject matter and better integrate the platform with the official curriculum.

In conclusion, the initial evaluation of the ControVerso project demonstrates promising potential for the use of digital platforms in promoting historical memory and critical thinking within civic education. While the pilot test yielded positive responses regarding student engagement and the development of reflective skills, further research is necessary to fully assess the impact and to refine the integration of such innovative tools into everyday educational practices.

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DESIGNING PUBLIC SERVICES THROUGH DIGITAL TWINS: A MULTI-SCALE PERSPECTIVE

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ABSTRACT | Governments face increasing pressure to optimize public services under constrained budgets and rising citizen expectations for accessible, high-quality services. Digital Twins (DTs)—virtual representations of physical systems—offer new possibilities for resource optimization and decision-making.
This research explores how Service Design (SD) can enhance DT integration in the Public Sector across different levels. The goal is to ensure that DTs do not function solely as technological solutions but actively support service transformation, aligning with public needs and institutional objectives.
For public administrations, Digital Twins enhance strategic planning, service efficiency, and civic engagement. Examples include supporting local governments in forecasting urban development, managing utilities in innovation districts, simulating mobility scenarios, and collecting citizen input on infrastructure projects via digital platforms. The variety of these projects can obstruct the understanding of what tangible assets are twinned, underlining the first research gap, and engaging in the creation of the first framework.
Simultaneously, Service Design, as an interdisciplinary field, can provide skills of User Research, Strategic and Operations Management, Interaction, and Graphic Design. However, SD's application in DT projects has often been limited to economic models, such as service-dominant logic. Thus, the second research gap is the lack of knowledge on the role of Service Design in Digital Twin projects, covered by the creation of a second framework.
This study employs an integrative literature review to identify key challenges, best practices, and opportunities for DTs in Public Sector and Service Design methodologies.

As a result, the study describes two interconnected frameworks: Digital Twin Levels According to Physical Entities Twinned and Service Design role in Digital Twin projects. The first introduces a classification of Digital Twin levels based on the physical scale of twinned entities, distinguishing between Human, Populations, Equipment, Building, Living organisms, Non-living components, and Urban Digital Twins.
The second framework accomplishes the previous one by explaining the Service Design role in Digital Twin projects through Service Design thinking phases (exploration, creation, reflection, and implementation), describing Service Design fields impact: User Research (empathising through immersion), Strategic Management (creating sense of urgency and desire for the future, building trust, and managing complexity), Operations Management (mapping service systems, orchestrating feasible concepts, balancing efficiency and experience, and managing service transitions), Interaction Design (enhancing usability, and humanising technology), and Graphic Design (visualising complexity, reducing cognitive load, and promoting visual reliability).
To connect two frameworks, the article describes what relevant Service Design disciplines can be activated for different DT levels. Starting from Human, Population, and Equipment DT, the main suitable fields can be User Research and Interaction Design, while for Living organisms, Non-living components, Building and Urban DTs, the main field may be Strategic Management. Additionally, the study outlines the PhD research plan, which explores DT integration across public services.
This research reinforces the role of Service Design in making Digital Twins across different levels more human-centered, usable, and understandable to public services.

KEYWORDS | DIGITAL TRANSFORMATION, PUBLIC SECTOR, PUBLIC ADMINISTRATION, HUMAN-CENTERED DESIGN, USER EXPERIENCE

1. Introduction

Governments are increasingly challenged to make cuts in public spending due to economic crises, risking the quality of services delivered to citizens. Simultaneously, there is a growing demand for sophisticated and affordable public services (Mager et al., 2016). This dual challenge highlights the urgent need for innovative solutions to optimize service delivery.
Digital transformation is critical for addressing these challenges; however, its full potential remains largely untapped in the Public Sector (Alvarenga et al., 2020). Policymakers and service designers are urged to leverage data and digital platforms to create more responsive public services (Mager et al., 2016).
Among transformative technologies, Digital Twins — virtual representations of physical systems — have proven effective in planning, optimizing, and monitoring processes (Kaivo-oja et al., 2020). Could it be beneficial in advancing the Public Sector, and at what level? What is the Service Design role in this process?
To address these questions, the research presents two scientific frameworks derived from an integrative literature review that analyzes, critiques, and synthesizes literature (Torraco, 2005), using as keywords Digital Twin, Service Design, and Public Sector.

2. Digital Twins and Service Design in the Public Sector

In industries, For government agencies, some research already highlights the need to

initiate feasibility studies on the use of DTs in their areas (Rasheed, San and Kvamsdal, 2020). The main examples of using DT in the Public Sector are:

- The Digital Twin bureaucracy demonstrates autonomous decision-making to manage government affairs (Eom, 2022).
- The Rome Technopole develops a building DT for managing energy and the water cycle as part of a regional innovation hub (Rome Technopole, n.d.). As a contributor to this initiative, the author is involved in creating Service Design strategies to support its implementation as described in another article (Ershova et al., 2024).
- Interactive DT platforms enable citizens to give feedback on urban developments, enhancing transparency and engagement (White et al., 2021).
- DT simulation models optimize public policies, such as improving bike-sharing systems (Hwang & Choi, 2023).
- The Digital Twin of Bologna supports local government forecasting, strategic decisions, and civic innovation (Gemello Digitale di Bologna, n.d.).
- The variety of these projects can obstruct the understanding of what tangible assets are twinned, underlining the first research gap, and engaging in the creation of Digital Twin Levels According to Physical Entities Twinned Framework.

At the same time, Service Design (SD), as an interdisciplinary field, can provide skills in User Research, Strategic and Operations Management, Interaction, and Graphic Design (Stickdorn and Schneider, 2012). By shifting from supply-oriented to demand-oriented models, SD supports decision-making and accessibility, while aligning solutions with citizen needs (Mager et al., 2016).
While Service Design has been introduced in DT projects, its application has often been confined to economic frameworks, such as value creation through service-dominant logic. Additionally, Interaction Design, a discipline within SD, has been studied in DT projects but mostly in relation to interface development rather than broader systemic applications (Lyu, 2024).
Merging the DT approach and SD is promising for the Public Sector. While DTs provide data-driven insights into ‘what’ is happening, SD explains ‘why’, ensuring solutions are effective and meaningful.
However, it is not entirely clear what SD can do for DT initiatives, that is the second research gap, addressed with the development of the Service Design role in Digital Twin projects Framework.

3. Digital Twin Levels According to Physical Entities Twinned Framework

The first research gap is a lack of systemic thinking in analysing DT projects, as it is not always clear what the physical asset is twinned. This gap can be especially crucial for Service Designers as one of their principles is Evidencing (making the intangible tangible) and to do so, there is a need to understand what physical assets already exist.
As Digital Twin technology advances, its applications extend across various domains, each corresponding to different physical levels of twinned entities. These levels range from Human Digital Twins that replicate individual human characteristics to Urban Digital Twins that model entire cities (Lyu, 2024). While existing classifications of DTs often focus solely on application fields, such as urban planning (Figure 1), this article proposes a classification (Figure 2) based on the physical scale of the twinned entity, offering a more structured framework for understanding their diverse applications in public services.

A Personal Digital Twin or Human DT represents a virtual version of an individual, constructed from their digital footprint (Nativi et al., 2022). In healthcare, Human DTs merge real-time health data, offering capabilities such as simulation, visualization, and predictive analysis (Shengli, 2021). Similarly, in retail and digital marketing, Human DTs analyze consumer behavior to enhance personalized recommendations (Vijayakumar, 2020). Beyond individual representations, populations of Human DTs can be aggregated to form a "family" of Digital Twins, enabling urban planning applications such as population density mapping or agent-based simulations. By combining individual DTs, cities can generate more flexible and dynamic data sources for policy planning and public administration (Lyu, 2024).

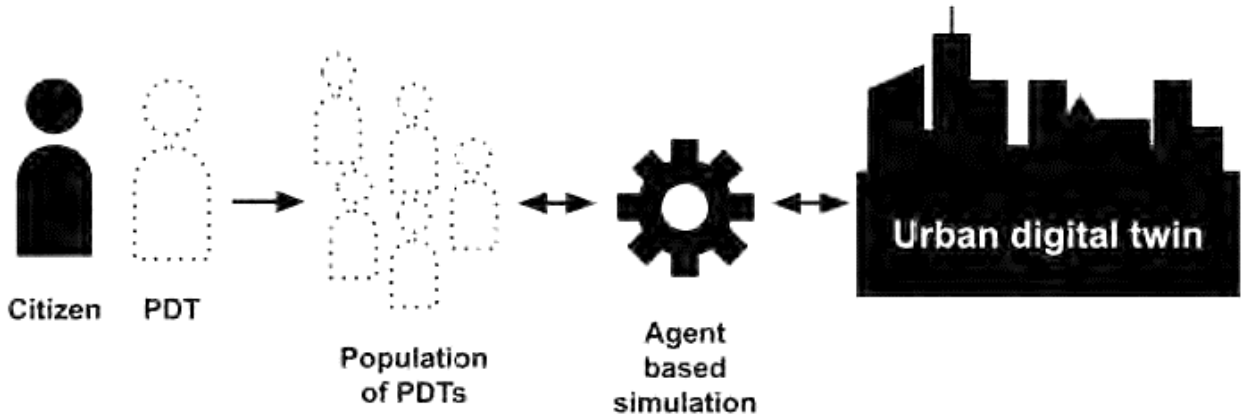

Figure 1 - The conceptual link between Personal Digital Twins and Urban Digital Twins, formed by populations and agent-based simulation

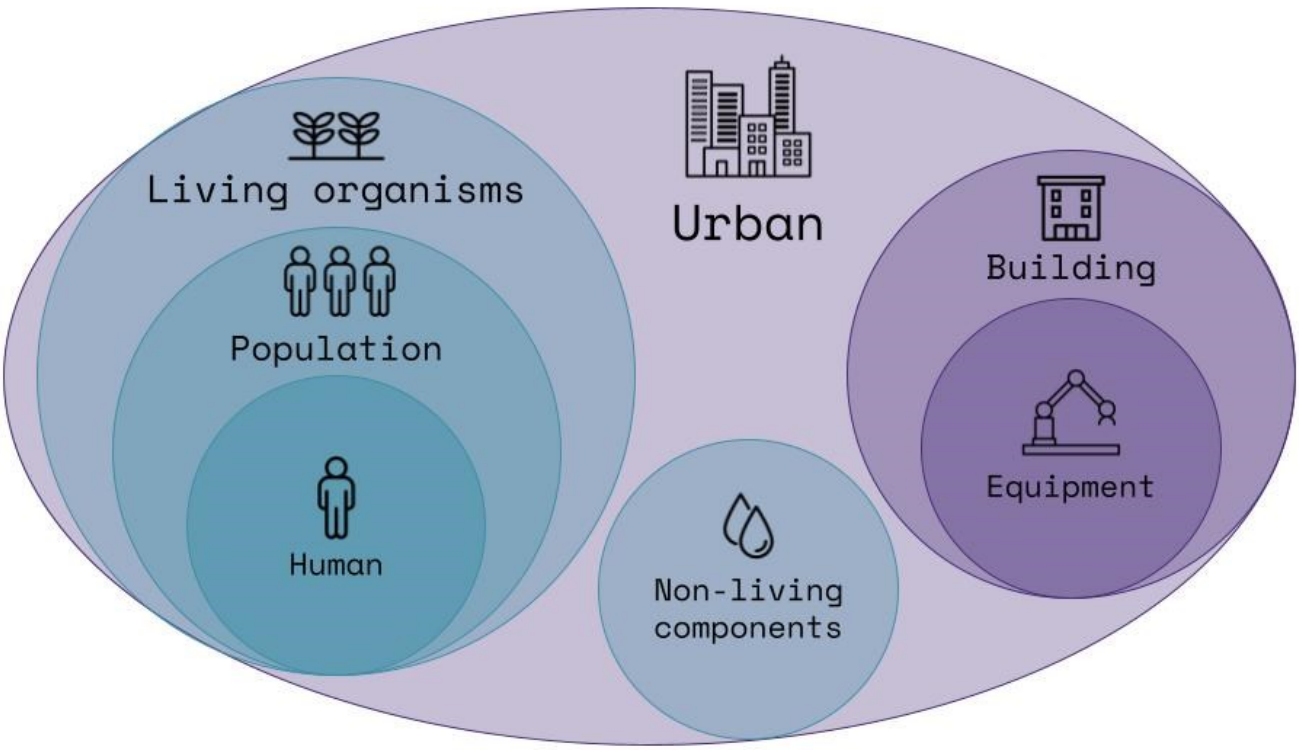

Figure 2 - DT Levels According to Physical Entities Twinned (in blue: ecosystem components; in violet: artificial assets)

At a more infrastructure-focused level, the Equipment Digital Twins model includes machines, tools, and industrial devices. They are widely used in healthcare and manufacturing, where they facilitate predictive maintenance and optimize operations through real-time monitoring. Similarly, Building Digital Twins integrates construction and urban planning by simulating the performance of physical structures, enabling better resource management, energy efficiency, and facility operations (Lyu, 2024), e.g., Rome Technopole. Expanding beyond individual buildings, Urban Digital Twins model entire cityscapes, incorporating aspects such as mobility, energy consumption, and environmental conditions. These models enable planners to analyze infrastructure interactions, simulate transportation flows, and optimize public services (Lyu, 2024), e.g., the Digital Twin of Bologna.
This article proposes additional groups: the Living organisms - biotic and the Non-living components - abiotic (Liu et al., 2021). The Living organisms represent creatures within an ecosystem, like plants, animals, and bacteria, while Non-living components are entities, such as water, soil, and atmosphere. The need to insert this group is in the existence of Digital Twins of such type, for example, for the Living organisms there is Forest DT (Buonocore, Yates and Valentini, 2022), while for the Non-living components there is the DT of an atmospheric environment (Abutalip, Al-Lahham and Saddik, 2023).
While previous classifications of DTs often categorize them by application fields, such as urban planning (Figure 1), this classification emphasizes the physical scale of the twinned entity, allowing for a more systematic approach to integrating DTs across sectors (Figure 2). Beyond these physical levels, DTs can also focus on specific characteristics of entities or model interactions and processes between them. For instance, in supply chains, DTs track logistics, optimize workflows, and enhance decision-making by linking multiple entities into a unified digital system. This broader perspective highlights the need for integrating human-centered and systemic approaches in DT development to maximize their potential across different scales.

4. Service Design role in Digital Twin projects Framework

As The second research gap is the lack of knowledge on the role of Service Design in Digital Twin projects. To cover this gap, the Service Design and Engineering roles are described in the form of a framework (Figure 3).
The framework puts the Digital Twins projects within Service Design thinking phases (Stickdorn and Schneider, 2012): exploration (understanding of situation), creation (exploring possibilities), reflection (testing ideas), and implementation (realization and engagement).
Service Design as an interdisciplinary field for DT projects can be subdivided into: User Research, Strategic Management, Interaction Design, Operations Management, and Graphic Design (Stickdorn and Schneider, 2012).
Each of these disciplines is described by the impact that they have on DT projects.

- The User Research is useful, especially in the exploration phase, as an impact can provide empathising through immersion (understanding of stakeholders' everyday lives).
- The Strategic Management initially can be needed for creating sense of urgency and desire for the Future (highlighting risks of inertia), building trust (creating confident relationships with stakeholders), and then managing complexity (translating ambiguous strategic tensions into design opportunities).
- The Interaction Design discipline can be especially useful in creation and reflection phases for enhancing usability (ensuring ease of service use), and then humanising technology (bridging digital touchpoints with emotional and

sensorial experience).

- The Operations Management should be used for all phases to mapping service systems (revealing inefficiencies and hidden interdependencies), orchestrating feasible concepts (aligning emerging service ideas with real institutional capabilities), balancing efficiency and experience (testing operational viability while maintaining quality and emotional resonance), and then managing service transitions (supporting role clarity across front- and backstage).
- The Graphic Design is also needed across all phases, initially to visualising complexity (making intangible systems understandable), reducing cognitive load (enhancing accessibility of information), and then promoting visual reliability (ensuring consistent visual content) (Stickdorn and Schneider, 2012).

After the Service Design impact, there is a need to describe the Engineering role to align responsibilities during project development.
The Engineering role can be described by enabling data-driven understanding (ensuring that all required data is accessible, e.g. using Internet of Things), creation developing predictive models and intelligent systems (creating models, analyses, and functions using Big Data analytics and Machine Learning), and then reflection translating system feedback into meaningful interactions (creation of user-specific applications, which provide important information to the user, contributing value to them) (Lyu, 2024).

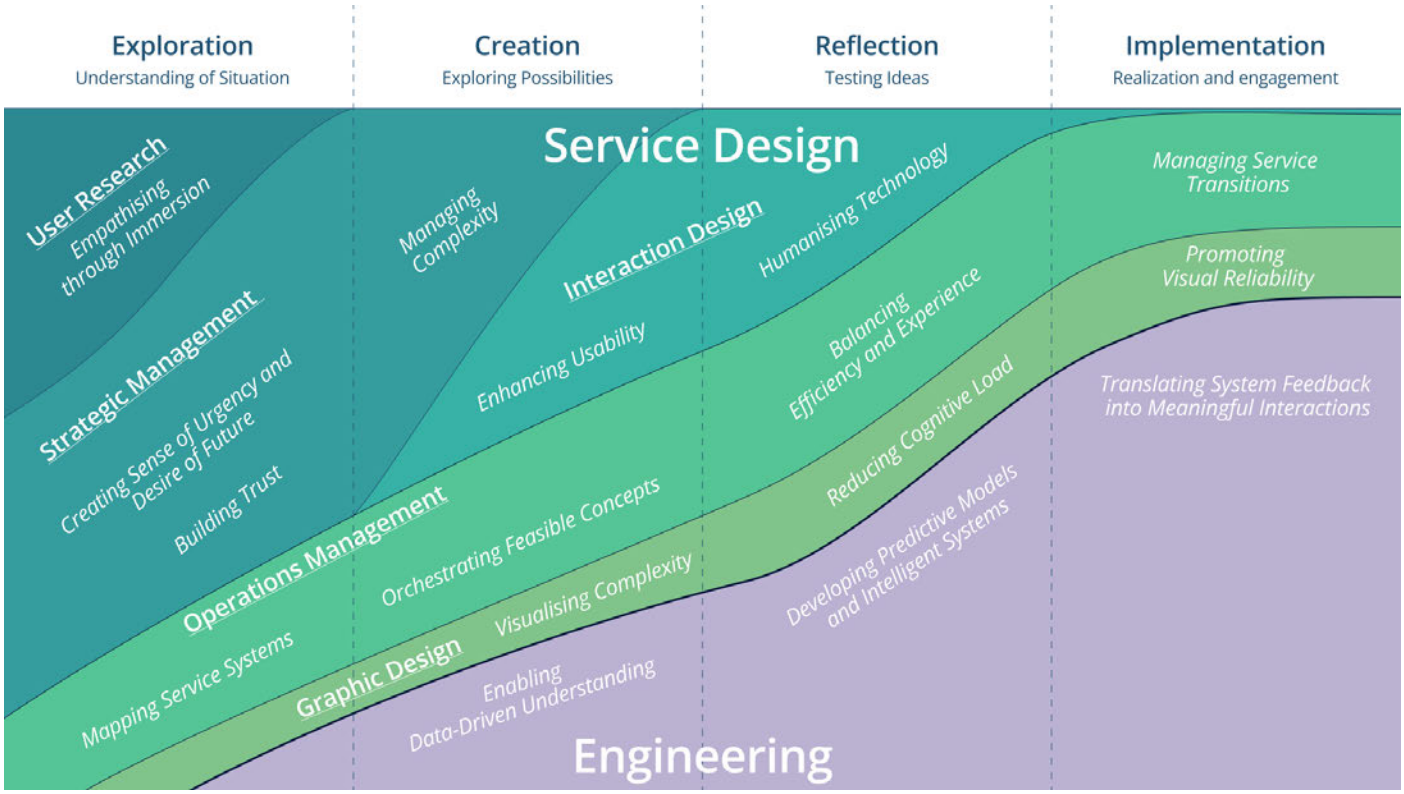

Figure 3 - Service Design role in Digital Twin projects Framework (in green: Service design impact, divided by SD disceplines; in violet: Engineering impact)

To bridge the two frameworks, this study identifies which Service Design disciplines can be strategically activated at different levels of Digital Twin (DT) implementation. For Human, Population, and Equipment DTs, disciplines such as User Research and Interaction Design are most relevant, as human-centricity is central to these applications (Lyu, 2024). In contrast, Living Organisms, Non-living Components, Building, and Urban DTs demand a focus on Strategic Management, given the complexity and risk associated with large-

scale infrastructure and environmental systems (Gemello Digitale di Bologna, n.d.). Additionally, Operations Management and Graphic Design consistently play a critical supporting role across all DT projects, ensuring both efficiency and clear communication.

To test and enrich these frameworks, the PhD research (Figure 4) will apply them across different public projects. In particular, these frameworks are the result of the first phase, Desk research, and will be explored and experimented with during the second and third phases. On a broader scale, PhD research is devoted to exploring the integration of the Digital Twin approach into the Italian Public Sector, to improve the quality and efficiency of public services through different DT levels.

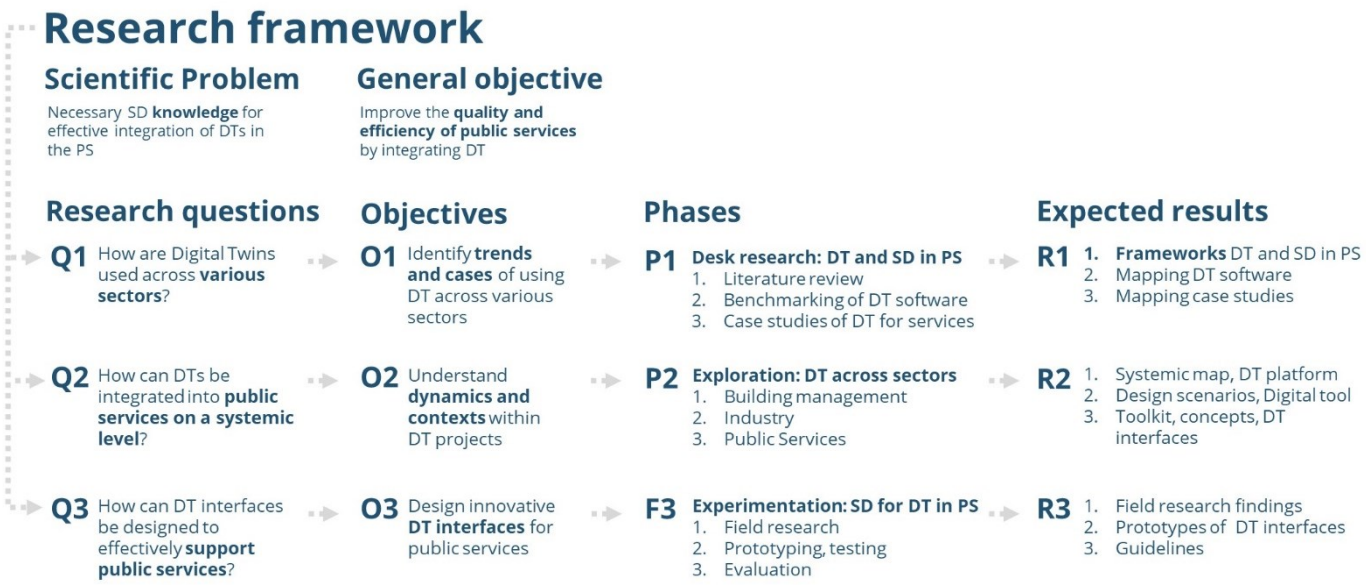

Figure 3 - PhD research framework

5. Conclusion

The The study describes two interconnected frameworks: Digital Twin Levels According to Physical Entities Twinned and the Service Design role in Digital Twin projects.
The first framework can be limited in the sense of requiring physical assets, for example, the case of Digital Twin bureaucracy may concentrate more on the process rather than physical entities, in this case, paperwork. During the description of the levels, no Equipment DT example for the Public Sector was found that can be an opportunity for further investigation.
The second framework about the Service Design role in Digital Twin projects can be limited in the sense of practical investigation, as so far, there are only a few projects found that apply SD thinking in DT projects.
Moreover, the integration of Digital Twins into public services offers benefits but raises technical, ethical, and governance risks, especially around AI, IoT, and Big Data (Jones et al., 2020). DTs risk reinforcing bias, particularly when based on discriminatory datasets (O'Neill, 2016). Privacy concerns grow as datafication quantifies citizens (Vesnic-Alujevic et al., 2019), like China's social credit score (Creemers, 2018). Algorithmic decision-making can decrease transparency and democratic engagement (Zuboff, 2019). Without clear governance and ethical regulation (Nemitz, 2018), DTs may amplify institutional control rather than empower citizens. Further investigation of technical, ethical, and governance risks for different DT levels may be the future topic of research.

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Evaluation of China's rural design development quality and construction of demand scenario strategy based on scenario theory framework

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ABSTRACT | The level of design in rural areas affects the quality of life of villagers, but the effectiveness of design intervention has long been unable to be quantitatively assessed, resulting in uneven design participation. This paper explores the role of scenario-based design evaluation in addressing fragmented design participation in rural China, offering a structured model that connects stakeholder needs with strategic design interventions. By integrating scene theory with a hybrid AHP–FCE–SWDM evaluation model, and using Qianjiadian Town in Beijing's Yanqing District as an empirical case study, the study offers a rigorous and context-sensitive approach to prioritizing rural design strategies. AHP extracted criterion weights, and FCE yielded scenario scores, and embedding these outputs into SWDM produced prioritized, context-sensitive strategies: farmer–designer co-creation workshops, cross-regional design alliances, culturally embedded infrastructure upgrades, phased digitalization, and AI-powered governance toolkits. Our framework links grassroots needs to national policy, offering an evidence-based toolkit for practitioners and policymakers. At the same time, it also has reference significance for other regions facing challenges of rural transformation and policy localization

KEYWORDS | Rural design, Analytic Hierarchy Process(AHP), Fuzzy comprehensive evaluation, Scene theory, Decision support model

1. Introduction

Design participation in rural construction activities encompasses a spectrum of processes, from needs assessment (HUA.Y et al., 2023; WANG.Y and YOU.L., 2019) and scenario analysis (WANG.H et al., 2023) to functional planning (SUN.L and WANG.J., 2020), digital transformation (RUI.G and HU.W., 2023; ZENG and HU.Y., 2024), ecological design (Lafortezza and Brown, 2004), and cultural transmission (LIU.Q et al., 2024; LAN.J et al., 2024; WANG.C and CHEN.Z., 2024). These design interventions directly influence the sustainability and livability of the Chinese countryside. From an evaluation perspective, previous evaluation methods—from SWOT analysis (Roos, 2016) to single-case AHP applications (HE.X et al., 2020) (LI.X et al., 2022)—tend to address individual villages or dimensions in isolation. Meanwhile, scene theory offers a robust qualitative lens for socio-spatial understanding (Wollenberg et al., 2000; Meyrowitz, 1994) but lacks a clear mechanism for operationalization in design decision-making. To bridge these gaps, this study poses two questions:

1. Which rural design scenarios manifest the greatest unmet needs according to multi-stakeholder priorities?
2. How can qualitative scene theory insights be quantified and aligned with national policy mandates to guide practical design interventions?

2. Methodology and Data sources

2.1. Constructing rural design scenarios and indicators within the framework of scene theory

Figure 1 describes how to construct the elements of Chinese rural design scenarios. First, typical elements of scenario theory from a broad perspective are extracted, such as: "community"(Wollenberg et al., 2000) "material structure"(Silver et al., 2007) and "diverse populations"(Silver et al., 2007), and the cultural value of scenarios created by the combination of these three elements and their activities.

In combination with the policy guidance of comprehensive revitalization, the twenty-character policy and the five-in-one policy in China's rural revitalization strategy, we extracted keywords: talent revitalization, industrial revitalization, economic construction, cultural construction, effective governance, etc., integrated them into the concepts of the word frequency matrix, and corresponded them to the elements of the scenario theory to form the rural design scenario elements suitable for China's national conditions, namely life and communication - community neighbors, environmental infrastructure - material structure, participants - diverse people, management and construction - activities and combinations, and cultural elements - cultural values.

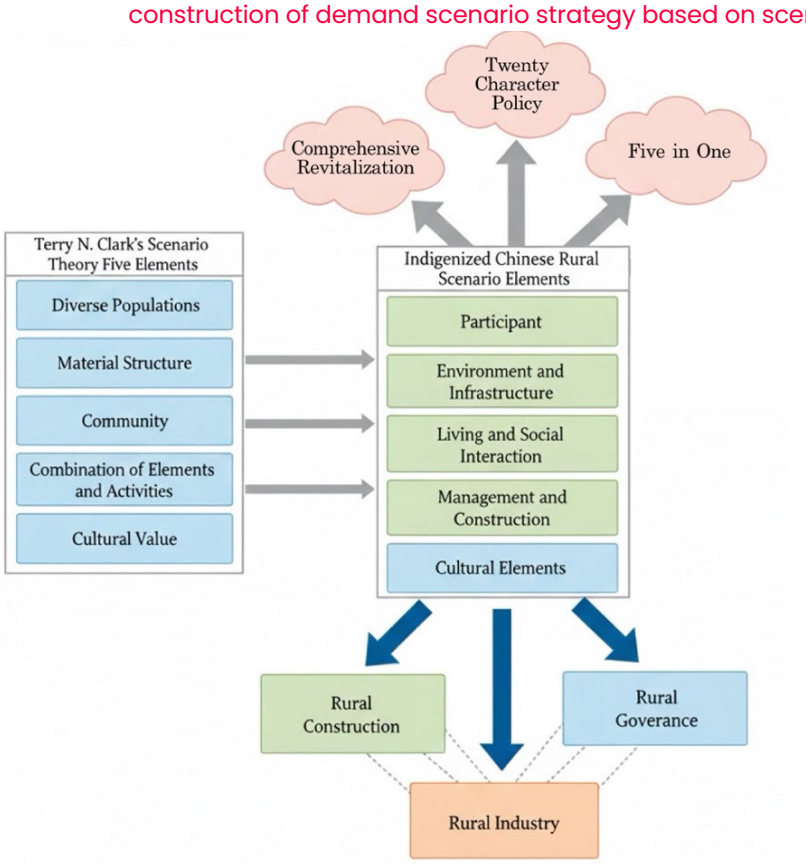

Figure 1. Logic of constructing rural design scenarios within the framework of scene theory

Figure 2 depicts the relationship between scene elements, scenario types, and evaluation indicators. T The 2024 and 2025 No. 1 Central Document refocuses on rural industries, construction, and governance, elevating "harmonious countryside" goals (State Council, 2024 and 2025). Each of the five scene elements connects to specific scenario types (e.g. "Rural Industry," "Rural Construction," "Rural Governance"), which in turn correspond to measurable indicators in AHP–FCE hierarchy. This mapping underpins how we weight qualitative scene constructs into quantitative evaluation criteria.

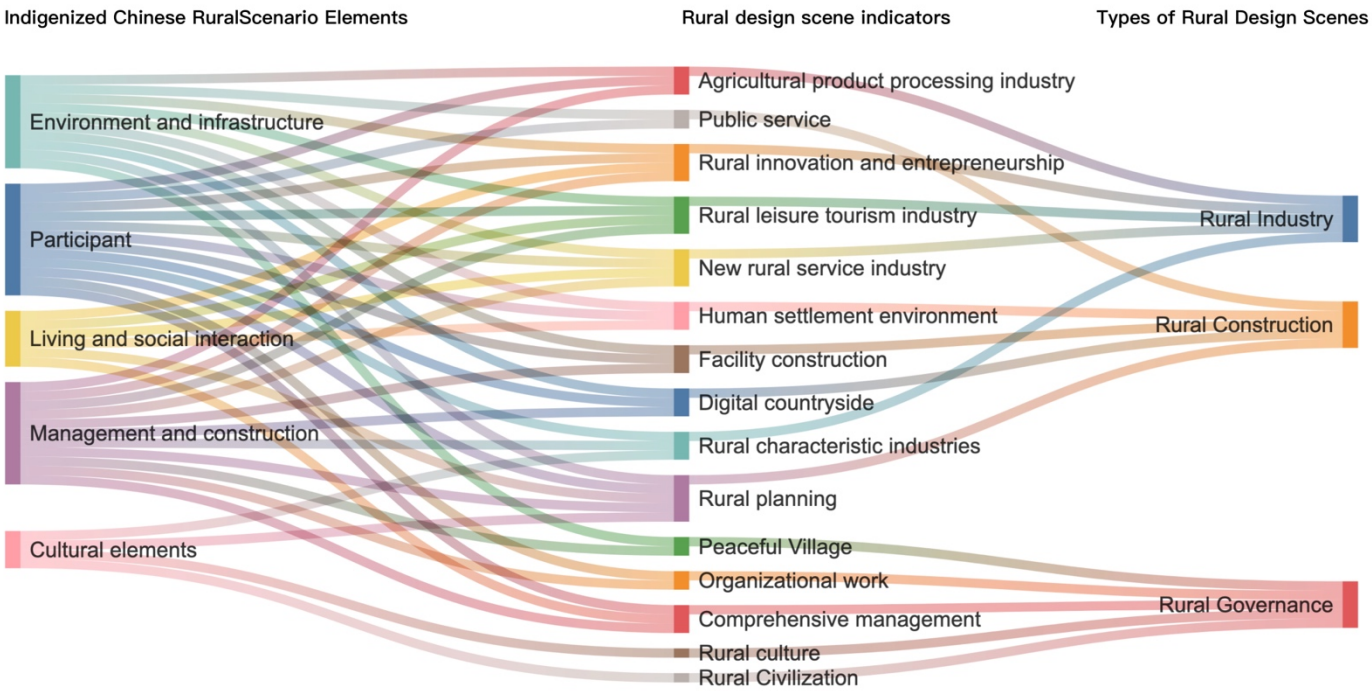

Figure 2. China rural design scene relationship diagram

2.2. Methodology and Data sources

We begin by defining four criterion dimensions (Commercial, Social, Cultural, Functional) and their sub-dimensions (Table 1)through AHP: experts perform pairwise comparisons to build judgment matrices and compute weights via the product-sum method (Sun et al., 2023). Next, We have established a three-level indicator system (3 criteria, 15 elements, 57 schemes) (Table 2), four criterion evaluation dimensions and sub-dimensions are used as evaluation elements to capture industry, construction, and governance scenarios. We then apply a fuzzy comprehensive evaluation using the weighted-average operator M(·,⊕) to aggregate expert ratings at the target, criterion, and factor layers (Zhu, 2022).

Table 1. Evaluation dimension

Evaluation dimension	Secondary evaluation dimension	Dimension Description
Commercial Value F_1	Rural demandF_{11}	Whether it directly meets the specific needs of rural areas, such as agricultural production, healthcare, education, infrastructure, etc.
	Cost effectivenessF_{12}	Is the development, deployment, and maintenance costs and commercial benefits affordable
	Universality of the planF_{13}	Does the underlying data or technical model have the ability to migrate scenarios
Social Value F_2	Policy alignmentF_{21}	Is it consistent with the rural revitalization development strategy and national policies
	Community participationF_{22}	Can it promote community participation and sharing, ensure better integration of solutions into rural areas, and meet practical needs
Cultural Value F_3	Cultural inheritance and innovationF_{31}	Is it conducive to the protection and dissemination of cultural characteristics
Functional Value F_4	Technical feasibilityF_{41}	Is the required hardware, software, and technical support feasible
	Resource availabilityF_{42}	Whether the resources required for the demand scenario match the existing resources, including technical talents, training, data collection and maintenance, etc.
	System scalabilityF_{43}	Can we better respond to changes in rural development and demand

Table 2. Evaluation index system for Chinese rural design scenarios

Target layer$\boldsymbol{A}$	Criteria layer$\boldsymbol{B}$	Element layer$\boldsymbol{C}$	Plan layer$\boldsymbol{D}$
Evaluation Index System for Chinese	Rural industryB_1	Agricultural product processing industryC_1	Diversified development of agricultural productsD_1
			Agricultural product processing industrial parkD_2
			Cultivation of new processing formatsD_3
			Agricultural product processing equipment research and

Rural Design Scenarios A			developmentD_4
		Rural characteristic industryC_2	Traditional craftsD_5
			Traditional cultural industriesD_6
			Cultivation of characteristic brandsD_7
		Rural leisure tourism industryC_3	Tourism areas around citiesD_8
			Tourism areas around natural scenic spotsD_9
			Tourism areas with folk customs and ethnic customsD_{10}
			Tourism areas in traditional agricultural areasD_{11}
		New rural service industryC_4	Productive service industryD_{12}
			Life service industryD_{13}
			Rural e-commerceD_{14}
		Rural innovation and EntrepreneurshipC_5	Cultivation of entrepreneurial entitiesD_{15}
			Rural innovation and entrepreneurship parkD_{16}
			Entrepreneurship guidance service platformD_{17}
	Rural constructionB_2	Rural planningC_6	Village layoutD_{18}
			Rural space designD_{19}
			Rural landscape controlD_{20}
		Human settlement environmentC_7	Toilet revolutionD_{21}
			Sewage treatmentD_{22}
			Garbage disposalD_{23}
			Pole line renovationD_{24}
			Greening and beautificationD_{25}
		Facility constructionC_8	Rural planning and constructionD_{26}
			Road clearance projectD_{27}
			Rural housing quality and safety improvement projectD_{28}
			Agricultural product logistics facility construction projectD_{29}
			Rural clean energy construction projectD_{30}
		Public serviceC_9	Education and running schoolsD_{31}
			Agricultural vocational educationD_{32}
			Medical and health systemD_{33}
			Elderly care and disability assistance service facilitiesD_{34}
		Digital villageC_{10}	Information infrastructure constructionD_{35}
			Big data systemD_{36}
			Smart agricultureD_{37}
			Digitalization of rural management servicesD_{38}
	Rural governanceB_3	Organizational workC_{11}	Administrative affairsD_{39}
			Electronic government affairsD_{40}
			Innovation of villager deliberationD_{41}
			Village affairs archive managementD_{42}

Comprehensive managementC_{12}	Villagers' self-governmentD_{43}
	Legal publicityD_{44}
	Moral constructionD_{45}
	Supervision platformD_{46}
Rural cultureC_{13}	Cultural publicity and educationD_{47}
	Cultural facilities constructionD_{48}
	Traditional cultural protectionD_{49}
Rural CivilizationC_{14}	Traditional virtuesD_{50}
	Family style constructionD_{51}
	Changing customs and habitsD_{52}
	Village rules and regulationsD_{53}
Peaceful VillageC_{15}	Safety hazard managementD_{54}
	Disaster prevention and mitigation projectsD_{55}
	Emergency management informationizationD_{56}
	Fire protection facilities constructionD_{57}

3. Results

3.1. AHP Weight Results

Before conducting the evaluation, all experts were familiar with the specific socio-economic and cultural background of Qianjiadian Town, as well as the current development and appearance of each village. The questionnaire, completed by 21 experts (13 design professors and 8 rural practitioners), yielded the pairwise comparison data necessary for AHP analysis. The results of the expert scores were collated and statistically analyzed. The weight values of each dimension in the importance evaluation of the rural design scenarios were calculated(Table 3).

Table 3. Evaluation dimension weight values

Evaluation dimension	WeightSort value	Secondary evaluation dimension	Weight value	Comprehensive weight value	Sort
Commercial	0.45641	Rural demandF_{11}	0.4013	0.1831	2
Dimension F_1		Cost effectivenessF_{12}	0.2592	0.1183	5
		Universality of the planF_{13}	0.3394	0.1540	4
Social	0.2503 2	Policy alignmentF_{21}	0.7609	0.1904	1
DimensionF_2		Community participationF_{22}	0.2391	0.0598	7
Cultural	0.1642 3	Cultural inheritance and innovationF_{31}	1	0.1642	3
Dimension F_3					
Functional	0.1291 4	Technical feasibilityF_{41}	0.5234	0.0675	6
Dimension F_4		Resource availabilityF_{42}	0.2465	0.0318	8
		System scalabilityF_{43}	0.2301	0.0297	9

3.2. Fuzzy comprehensive evaluation results

Using the weights derived from AHP and applying the fuzzy comprehensive evaluation (FCE) model, we assessed three primary rural design scenarios—Governance, Industry, and Construction—based on 57 evaluation indicators.The collected data were organized and calculated via the fuzzy mathematical model to establish the fuzzy comprehensive evaluation judgment matrix R. Fuzzy synthesis was performed on the evaluation vectors of each layer to obtain the evaluation scores for each indicator (Table 4).

Table 4. Comprehensive evaluation of the importance of rural design scenarios

Code	Target layer score	Level	Code	Criterion layer score	Level	Code	Factor layer score	Level	Total ranking
A	3.3143	V4	B_1	3.1408	V4	C_1	3.390	V4	8
						C_2	3.417	V4	7
						C_3	3.327	V4	9
						C_4	2.846	V3	13
						C_5	2.548	V3	15
			B_2	2.9214	V3	C_6	3.187	V4	11
						C_7	3.242	V4	10
						C_8	3.786	V4	1
						C_9	3.148	V4	12
						C_{10}	2.560	V3	14
			B_3	3.5967	V4	C_{11}	3.479	V4	6
						C_{12}	3.632	V4	4
						C_{13}	3.585	V4	5
						C_{14}	3.635	V4	3
						C_{15}	3.673	V4	2

4. Discussion

4.1. Interpretation of AHP Results

The primacy of Commercial Value reflects China’s emphasis on creating self-sustaining rural economies. This finding is consistent with literature emphasizing the role of rural industries and agricultural development in driving economic prosperity (Ngan et al., 2019). Under the 2024 No. 1 Central Document, rural industry enhancement and market integration are government priorities, which likely influenced expert judgments either. Social Value ranks second, underscoring the necessity of policy alignment and community participation to legitimize and sustain design interventions. The emphasis on social value reflects the growing awareness of rural communities' needs for participatory governance, social cohesion, and alignment with national development policies (Wang et al., 2024). The relatively lower weight of Cultural Value suggests a potential trade-off

between rapid economic growth and heritage preservation—a tension common in developing contexts. Finally, Functional Value (technical feasibility, resource availability, scalability) plays a supportive but less urgent role, indicating that stakeholders expect design solutions to be innovative yet grounded in existing capacities.

4.2. Analysis of Fuzzy Comprehensive Evaluation Results

Based on the results of rural industry B_1 (3.1408 points) in the comprehensive evaluation of the importance of rural design scenarios, targeted support is prioritized for the lowest-scoring innovation and entrepreneurship dimension C_5 (2.548 points), give full play to the participation perspective and role of design in rural industry management and operation, cultivating new rural business forms, and innovating new entrepreneurial models.

In the field of rural construction, infrastructure construction C_8 (3.786 points) scored the highest, indicating an urgent need for hardware facilities in rural development. At the same time, digital villages C_{10} (2.560 points) scored the lowest, reflecting the relatively lagging rural informatization construction.

The study shows that rural governance B_3 (3.5967 points) scored the highest, especially Peaceful Village C_{15} (3.673 points) and rural civilization C_{14} (3.635 points), reflecting that the current governance system is relatively complete. However, there is still room for improvement in organizational work C_{11} (3.479 points) and cultural protection C_{13} (3.585 points). Therefore, this study proposes to optimize governance transparency with digital technology and enhance villagers' sense of participation in cultural activities.

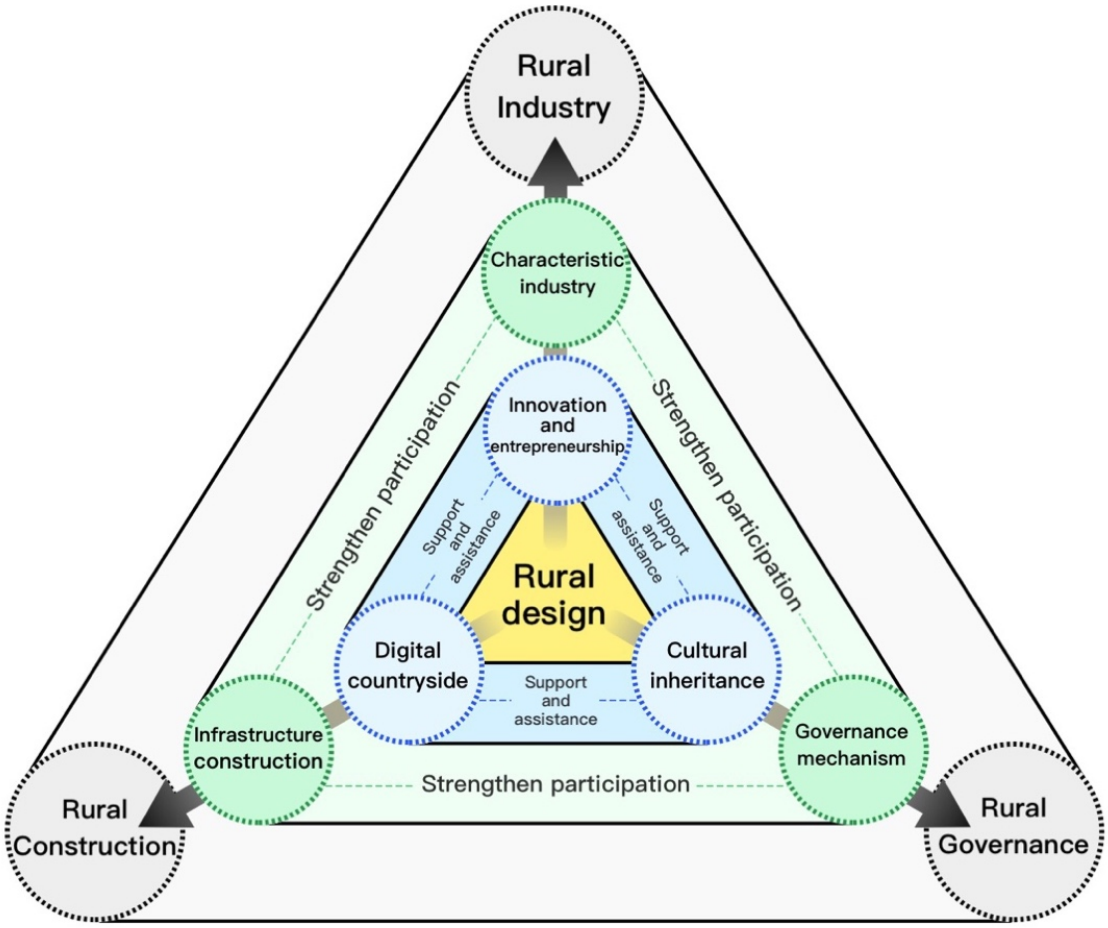

Figure 3. Development strategy of China's rural design demand scenarios

4.3. Design Strategies via SWDM

A: Industrial Revitalization: Commerce-Driven Multi-Stakeholder Synergy

Demand-Driven Industrial Scenario Design: Combined with the weight of the rural demand sub-dimension F_{11} (0.1831), a "farmer-designer" co-creation mechanism is implanted in rural industries to ensure that design proposals originate from the pain points of local producers.

Cross-Regional Innovation Systems: Relying on the universality of the plan F_{13} (0.1540), establish a cross-regional industrial design alliance to promote technology sharing and resource integration. For example, learn from Japan's "local creation" policy system, explore the design cooperation mechanism between rural and urban areas, and promote regional industrial linkage.

B: Construction Optimization: Upgrading the Functional Scenarios with Cultural Embedding

Infrastructure Optimization Based on Cultural Value: Under the interactive framework of "cultural elements-rural design scenes" in scenario theory, for cultural inheritance and innovation F_{31} (0.1642), optimize infrastructure on the basis of protecting traditional skills and enhance the cultural display in facility construction.

Rural Digitalization Promotion in Stages: Combined with technical feasibility F_{41} (0.5234), digital village construction is promoted in stages. Priority will be given to piloting smart agriculture and digital public services in regions with higher governance capabilities (governance score > 3.5) to ensure the feasibility of technology implementation.

C: Governance Innovation: Mechanism-Based Participatory Scenario Design

Intelligent Rural Governance Toolkit: Targeting community participation F_22 (0.0598), develop a "rural affairs design toolkit" to use artificial intelligence and big data to improve governance transparency. For example, learn from the Dutch "smart village" model and establish an online village affairs management system to enable villagers to participate in policy discussions and supervision.

Co-Creation Mechanism Based on Cultural Identity: Relying on cultural inheritance and innovation F_31 (0.1642), introduce design innovation in traditional festivals, such as holding "traditional craft workshops", and enhance the market value of intangible cultural heritage products through branded operations to promote rural cultural development.

5. Conclusions and Future Outlook

In this study, we have demonstrated how a scenario-theory-based AHP–FCE–SWDM framework can quantitatively translate qualitative rural design insights into prioritized, context-sensitive strategies. By operationalizing four weighted dimensions (Commercial, Social, Cultural, Functional) across three core scenarios (Industry, Construction, Governance), our approach revealed both strengths—such as robust governance mechanisms—and critical gaps, notably in rural digitalization and innovation participation. The resulting strategies (e.g. farmer–designer co-creation, phased digital pilots, AI-driven governance toolkits) offer actionable roadmaps for linking grassroots

needs with national “harmonious countryside” policies.

Looking ahead, several avenues warrant further exploration. First, longitudinal field trials of the proposed strategies will be essential to validate their real-world effectiveness and refine model weights over time. Second, integrating emergent technologies (digital twins, IoT sensor networks, AI for participatory design) could deepen the precision and adaptability of scenario interventions. Third, expanding the framework across diverse cultural regions—beyond the 12 provinces sampled here—will test its replicability and uncover region-specific scene elements. Finally, engaging a broader range of stakeholders, including village committees, private enterprises, and civil-society NGOs, can enhance co-creation mechanisms and ensure sustainable, equitable rural transformation.

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EXPANDING THE SENSITIVE POSSIBILITIES OF THE SEMIOTIC RELATIONSHIP BETWEEN OBJECT AND RECEIVER THROUGH IMMERSIVE INFOGRAPHICS.

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ABSTRACT | This article presents the research advances of the doctoral thesis in progress entitled *Interweaving Design, Art, and Technology to Explore the Semiotic Dimension of Objects in Hybrid Spaces*. The study integrates the fields of design, art, and technology to propose the development of an immersive infographic as a hybrid environment, utilizing mixed reality to examine the functional, aesthetic, and semantic dimensions of a specific technological product. The primary aim of this research is to highlight both the intrinsic functionalities and the sensitive and perceptual aspects involved in the conception of everyday objects through the use of immersive technologies. It is argued that objects created through design transcend their purely practical function, embodying aesthetic and symbolic values that grant them enduring recognition over time.
This research is theoretically grounded in the works of Frechin (the challenges design faces in the context of emerging technologies), Vial (a critique of contemporary design), Quarante (design theory), Norman (the emotional aspects of objects), Simondon (the relationship between objects and art), Fischer (metadesign), among others. Collectively, these theoretical frameworks provide a comprehensive foundation for understanding the multifaceted nature of objects and the transformative potential of design when integrated with emerging technologies.
The concept of immersive infographics is subsequently examined, drawing on the theories of Krum, and Liu et al., who propose augmented infographics within hybrid environments for enhanced data visualization. As sources of inspiration, the artistic installations *Cosmic Things* by Damián Ortega—which dissects iconic objects projected into the art world—and

Tate Sensorium—a multisensory experience based on artistic works—are analyzed. Finally, the methodology and preliminary results of the co-creation project *IN CORPUS: Un Rhizome Immersif*, developed in collaboration with the artist and doctoral researcher Juliana Marin—an immersive video art and virtual reality experience—are presented. The project was implemented during *La Nuit des Chercheurs* 2024 in Toulouse and the *Recherche-Création* seminar 2025 at the University of Toulouse Jean Jaurès. The methodological approach involved unstructured observation and the administration of 10 surveys during the second session.
The results showed a dynamic participation, although the interpretation considers people's lack of familiarity with virtual reality, technical challenges and spatial limitations. Nevertheless, a positive intention towards virtual reality and a remarkable interaction with the rhizome —study by Juliana Marin— was observed, which allows a possible approach to the concept of *metadesign*, as it was evidenced that people are motivated in experiences where they are participants to come up with ideas. These preliminary findings guide the next phase, focused on a mixed reality experience that addresses the identified challenges.

KEYWORDS | ART, DESIGN, INDUSTRIAL DESIGN, MIXED REALITY, IMMERSIVE TECHNOLOGIES

1. Introduction

Historically, the human being has conceived objects with a diversity of applications, which have acquired a representative significance at a cultural and social level, by virtue of the emotional charge that they accumulate and transmit through time.
However, in contemporary society, marked by mass production and accelerated consumption, there is a tendency to reduce the value of objects to their purely utilitarian function. As Simondon points out : “culture has a contradictory attitude towards technical objects: it treats them as pure assemblages of matter, devoid of any real meaning and with a single useful purpose.” (Simondon, 2012, p.11).

This perspective raises a question of crucial relevance to the field of design in the current era of technological adoption within the discipline: How can immersive technologies enhance users' perception of the functional, aesthetic and semantic values of objects?
In this context, Frechin's assertion becomes particularly relevant: “objects possess a cultural, symbolic, aesthetic and heritage dimension as powerful as a film, a book or a work of art” (Frechin, 2019, p.79).

This idea challenges the merely instrumental vision in which objects are perceived, inviting us to explore the true essence that gives them meaning. The present research is inscribed in this line of thought, seeking to unravel the potential of immersive technologies to revitalize the appreciation of these dimensions intrinsic to design objects.
To understand the origin of this problem and the role that design has played in shaping the relationship between humans and objects, it is relevant to consider its historical evolution. From a first generation centered on art and craft production as a meaning of social progress and artistic quality, design moved towards a second phase marked by the convergence of art, technique, science and industrial aesthetics, responding to a purpose oriented towards the human being, beauty and mass production, generations that Vial (2024) calls the philosophical model of design.
This development, exemplified by the emergence of the Bauhaus in 1919 and the

consolidation of industrial design in 1929 as “a discipline originating from the encounter between the arts and industry” (Vial, 2024, p.17), laid the foundations for a large-scale production that, while democratizing access to objects, may also have contributed to a certain homogenization and less attention to their deeper meanings.
In this scenario, various theorists have approached the complexity of objects from multiple dimensions. Quarante, based on Peirce's theory of signs, describes four main functions: “the referential function, the technical function, the utilitarian function and the semantic function” (Quarante, 2001, p.303).
These categories highlight the multifaceted nature of objects, beyond their simple practical use. In line with this vision, the overall objective of this research is to develop an immersive experience, inspired by the works 'Cosmic Things' by Damián Ortega and 'Tate Sensorium', that facilitates the semiotic analysis of a design object in a hybrid environment through mixed reality.
In this sense, Damián Ortega's work, by dissecting products through reverse engineering and exhibiting the intricate relationship of their components in artistic installations, offers a fundamental perspective for this research, which seeks to rescue the perceptive and sensitive values inherent to each constitutive element of an object.
In a complementary way, the 'Tate Sensorium' installation explores multisensory stimulation to experience static paintings, an approach that raises reflection on its potential application in everyday objects with the intention of highlighting their sensitive and symbolic value.
In this context, artistic installations conceived as hybrid experiences that link the real and digital dimensions can facilitate a rich experience in sensations and discoveries, expanding the possibilities of communication and perception of physical objects and, therefore, enhancing their intrinsic values to the viewer's perception.

Figure 1. Damián Ortega – Cosmic Thing, 2002, Volkswagen Beetle 1983, stainless steel wire, acrylic, Malmø Kunsthal, Sweden
Photo: Helene Toresdotter/konsthall.malmo.se. Taken from https://malmokonsthall.se/utstallningar/damian-ortega-casino/

2. Towards a convergence between technology and design

According to Frechin (2019), technologies exert a significant influence on design responses. This statement aligns with the various stages of the design process, which are consistently mediated by the use of technologies, ranging from three-dimensional modeling software and 3D printing for prototyping or large-scale production, to the more recent application of virtual reality in collaborative design.
In addition, the discipline is immersed in a continuous technological revolution, characterized by the emergence of new materials and the advancement of industrial processes. This includes the development of software progressively integrated with AI, which makes it possible to determine increasingly innovative design responses, overcoming the technological limitations that in the past might have restricted them.
This dynamic drives contemporary designers to adopt emerging practices with the aim of conceiving progressively innovative designs, optimizing the time and economic efficiency of production.
In this sense, the implementation and use of technologies such as virtual and mixed reality are based on this purpose. Following the perspective of Robledo et al. (2024) on their potential in co-design and participatory design to evaluate and modify designs efficiently, transforming individual perceptions into tangible results, it is highlighted that “the use of virtual and augmented reality have been proven to be more successful with respect to less immersive methods, especially by less expert people.” (cited in Elvezio et al., 2017).
In this context, these technologies emerge as an opportunity and a resource that, when used effectively, can enhance the perception of attributes usually neglected in objects, revaluing every detail of their composition. This approach can, in turn, boost participatory design processes, actively involving users in the appreciation of design objects.
Drawing upon these theoretical perspectives and synthesizing elements derived from the aforementioned artistic installations, the concept of immersive infographics is proposed. This is posited as a novel format, aligning with the classification of six existing formats elucidated by Randy Krum (2013), and also drawing inspiration from the concept of augmented infographics as described by Liu et al. (2022) in their research entitled 'Interactive Extended Reality Techniques in Information Visualization'.
Additionally, Goncalves (2017) points out that these advances make it possible to design experiences and devices capable of altering sensory perception and expanding our perceptual capabilities, redefining immersive experiences by representing hybrid environments where the digital becomes increasingly perceptible and sensitive in our reality.
In this sense, Frechin's idea is taken up: “new design could be defined as both an innovative design activity and an engaged creative activity that focuses on developing, creating and producing the link between technologies and objects for people and their environment.” (Frechin, 2019, p.134).
It is postulated that, as Fisher & Giaccardi point out that “the challenge of design is not a matter of getting rid of the emergent, but rather of including it and making it an opportunity for more creative and more adequate solutions to problems” (Fisher & Giaccardi, 2006, p.1), this integration will contribute to revalue the perception of objects through sensitive and immersive experiences inspired by art.

3. Methodology and results

Within the framework of this study, two initial experiences were carried out with the objective of evaluating virtual reality technology. The first experience focused on the

development of an immersive infographic (proposed as a new format involving virtual reality) entitled 'Infogverse', designed to explain the aesthetic value of a product conceived under the concept of biomimicry. This initiative was carried out with the intention of laying the foundations for future stages of this research, incorporating subsequently an analysis covering the functional, aesthetic and semantic dimensions of the objects.

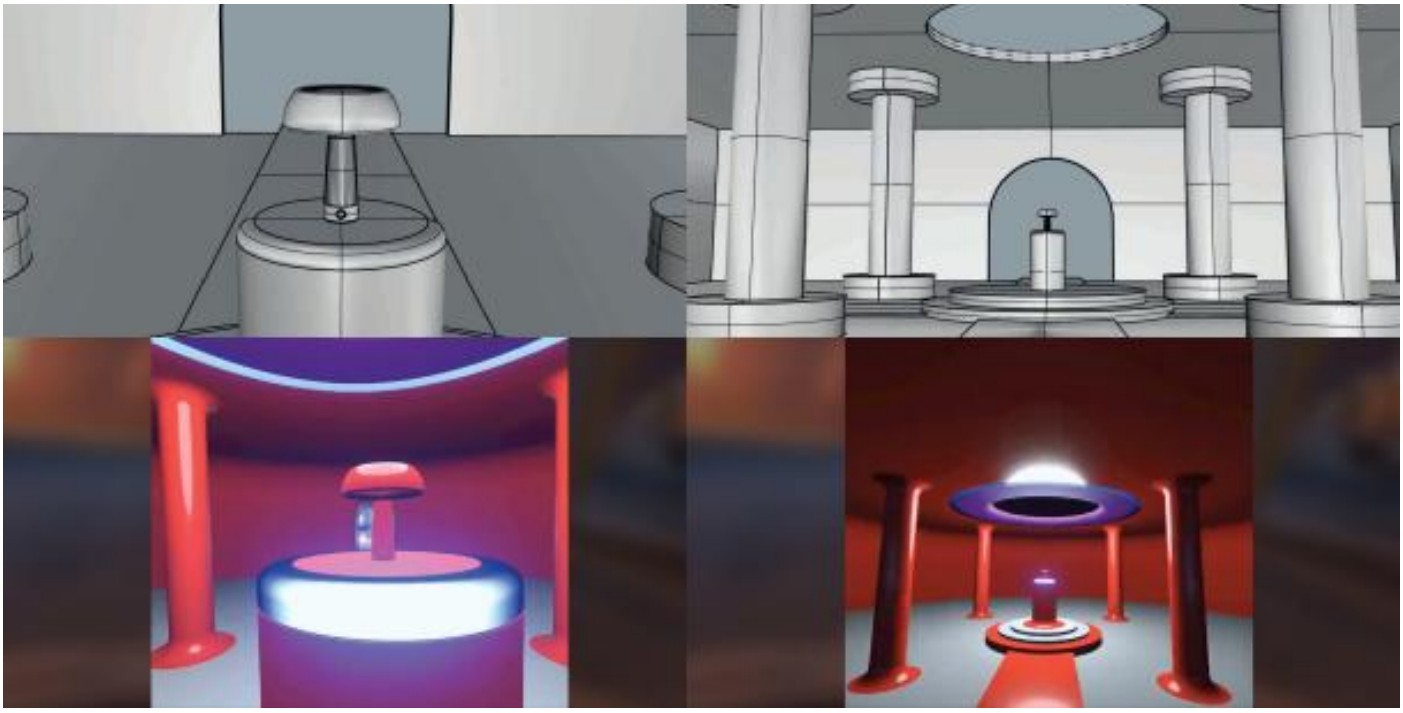

Figure 2. Virtual reality experience*: Infogverse*, an immersive infographic to explore the aesthetics of a product designed under the concept of biomimicry and inspired by the fungus *Rhodotus Palmatus*. The object is a lamp entitled *Rhodo Lamp*.

To continue the evaluation of virtual reality, a second experience was carried out, divided into two sessions: the first in the framework of the *Nuit des Chercheurs 2024* at the *Cité de l'Espace* in Toulouse, France, and the second at the seminar de *recherche-création 2025* at the Université Toulouse Jean Jaurès. This experience was developed in collaboration with artist and PhD student Juliana Marin, which allowed the intersection of two doctoral researches and the combination of perspectives from art, philosophy, design and technology.

In both experiences, the Meta Quest 2 virtual reality helmet was used. For the creation of the 3D environment, Blender 4.0 and Unreal Engine 5.5 software were used.

The first session of this second experience gathered around 60 participants (divided into two 45-minute experiences and 30 participants per session), who alternated between the immersion of the proposed video-art and the exploration of virtual reality. Given the nature of the event, the limited duration and the number of participants, an unstructured observation methodology was used.

General observations revealed active participation and curiosity towards the virtual reality experience, although technical challenges were identified that limited immersion related to internet connection (limiting spatial movement), lack of light (affecting the helmet's recognition of the environment) and users' inexperience with the technology, which prevented optimal fluency.

Although these factors could not be controlled due to the conditions of the experience, they did not impede the interaction of the participants with the technology. In this sense, the observations revealed an active participation and curiosity on the part of the attendees as they explored the virtual reality and interacted with the space designed in 3D, which represented the images projected through the video-art.

Figure 3. Virtual reality and immersive video art: exhibition *IN CORPUS : Un Rhizome Immersif* realized by Juliana Marin and Mario Arias at the *Nuit des Chercheurs 2024* at the *Cité de l'Espace* in Toulouse, France. Photo taken by Juliana Marin.

For the second session, with about 25 participants (10 immersed in virtual reality), the technological aspects mentioned above were taken into consideration. On this occasion, in addition to unstructured observation, a quantitative methodology was implemented to evaluate the experience through surveys using the Google Forms tool.
To evaluate experience and technology, eight multiple-choice questions were asked. The questions and their respective results are presented in the following table (table 1.) :

Table 1. Survey: Perception of experience through virtual reality

Question	Totally agree	Neutre	Not at all
1. Did this virtual experience allow you to feel or explore your senses, such as sight, hearing, touch, smell or taste?	90%	10%	-
2. Has this virtual experience transported you to another environment as if it were reality?	60%	40%	-
3. Do you think this experience lacks elements that allow you to feel through touch or smell to make it more immersive or make it seem much more real?	70%	30%	-
4. Do you think this technology, combined with other haptic technologies (technologies that allow us to feel virtual objects as if they were real), could have a positive impact on this virtual experience?	70%	30%	-
5. Would you explore an experience combining real and virtual reality (mixed reality)?	70%	20%	10%
6. Do you think that hybrid experiences combining real and virtual environments would make the immersive experience more realistic (for example, navigating in a virtual space while interacting with virtual objects and environments)?	70%	20%	10%
7. Do you think these technologies will enable us to explore all our senses beyond sight and sound, as we do in the real world?	30%	60%	10%
8. Did you enjoy the experience?	80%	20%	-

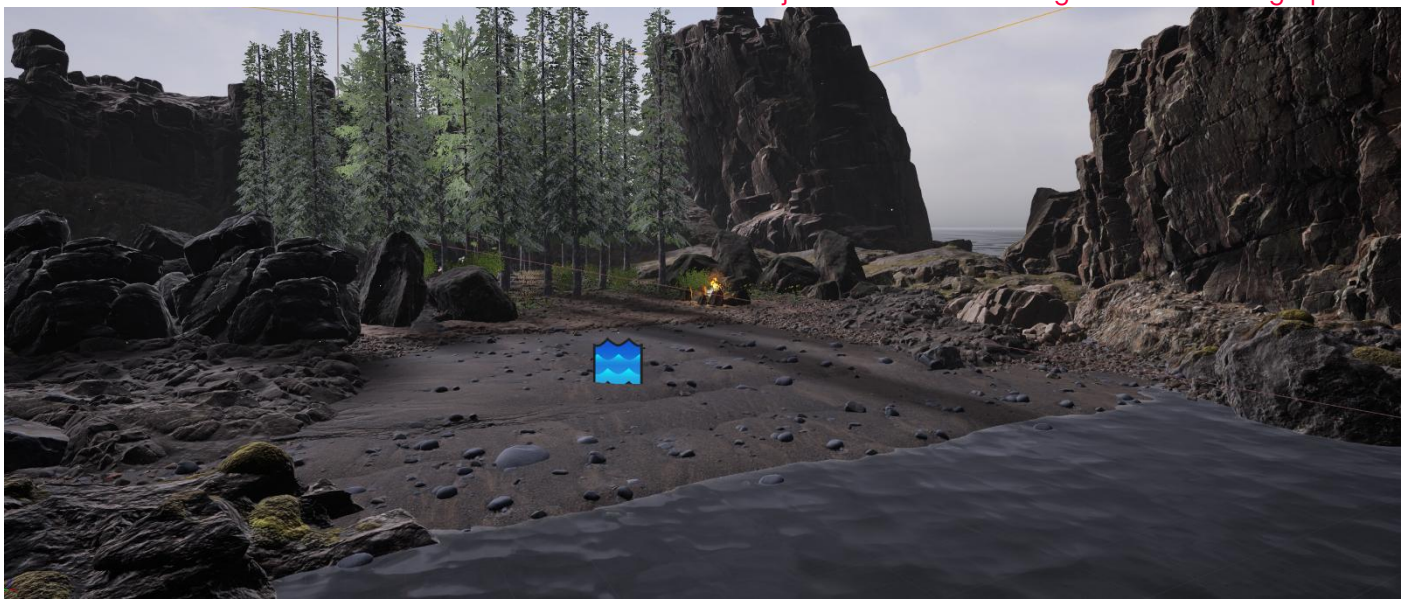

Figure 4. Virtual reality experience: immersion in a natural environment simulating part of the scenes projected in the video-art of *IN CORPUS : Un Rhizome Immersif* realized by Juliana Marin and Mario Arias at the *Nuit des Chercheurs 2024* and the *recherche-création 2025* seminar in Toulouse, France.

4. Conclusions

This research formulates a critique, from a design perspective, towards those objects conceived with an intention limited to their utilitarian value, which leads to a devaluation of objects in contemporary design. In contrast, it seeks to revalue designed objects through the integral consideration of their constitutive dimensions and the recognition of their sensorial and perceptive attributes, with the aim of generating a collective consciousness that encourages people to reflect and understand the intrinsic meaning of everyday objects through emerging technologies.

Regarding the tests conducted, the predominantly positive response of participants in previous experiences motivates the exploration of a new proposal that integrates physical and virtual spaces, ideally involving the totality of the senses and comprehensively addressing the technical challenges previously identified to ensure a more fluid experience. This crucial aspect is also recognized in studies such as Robledo et al. (2024), where the requirement of specific knowledge and skills for the interaction of participants with immersive technologies is pointed out.

In this sense, the experiences designed through the implementation of such technologies must, in turn, allow participants the time necessary to analyze and propose ideas in a reflective manner. Likewise, the space should be designed to actively invite and motivate participants, fostering a dynamic that is conducive to obtaining the desired results.

This conclusion is derived from the interaction of the participants at the end of the experience, through the rhizome proposed in the work of Juliana Marin, where a significant participation of the attendees was evidenced, who contributed ideas, showing their capacity for analysis and creativity.

Furthermore, this orients the research towards a potential participatory design, where users who analyze and interact with the object to understand its functional values can, in turn, become involved in the development of a design idea, contributing to the improvement and/or creation of the object focused on their needs. This approach allows to deepen Frechin's proposals and the concept of metadesign explored by Gerhard Fischer, in order to generate more innovative design processes through the active

participation of people.
In this sense, through these analyses, the objective does not lie in an intrinsic defense of technology, whose disadvantages are recognized, but in the conscious use of available resources to explore its advantages and possibilities for social benefit. Although this study focuses on objects created in the field of design, its findings can serve as a starting point for implementations in other contexts such as social design, education and art, among other disciplines.

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Fostering Responsible Design by Enhancing Entrepreneurial Competencies in Graphic Design Education

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ABSTRACT | As the role of graphic designers expands beyond aesthetics and execution, design education must equip students with skills to navigate complex challenges and foster responsibility in their practice. This paper examines gaps in traditional graphic design education as revealed through students' perceptions of their entrepreneurial competencies and explores the potential of an immersive learning experience to support their development. Traditional graphic design programs primarily focus on responding to client briefs, limiting students' ability to identify and define complex problems. To address this, a creative retreat was designed as an immersive learning experience, combining theoretical knowledge, hands-on workshops, and student self-directed projects. Held in January 2025, the retreat brought together 12 students, supported by a facilitator and a technician, to explore Responsible Entrepreneurship, which integrates social, environmental and economic considerations into design practice. Students participated in self-paced online modules, Design Thinking exercises, and practical experimentation using craft-based production techniques. At the start of the creative retreat, students completed a self-evaluation questionnaire to assess their entrepreneurial skills. The results indicated that they felt most confident in *Learning from Experience* and *Expressing Creativity*. However, they identified *Thinking Ethically and Sustainably*, *Planning and Managing a Project*, and *Possessing Financial and Economic Knowledge* as their weakest areas, reflecting broader educational gaps in business acumen and strategic project management. In parallel, the retreat incorporated four key learning modules: Social Responsibility, prompting students to reflect on issues such as race, gender, and social mobility in design; Environmental Responsibility, introducing sustainable materials and eco-conscious production techniques; Economic Responsibility, emphasizing financial viability of their project; and Awareness and Decision-Making, utilizing a tool to help

students balance social, environmental, and economic priorities in their projects. The findings emphasize that while students excel in creative expression and adaptability, financial literacy, project planning, and sustainability remain critical areas for development. These results suggest that integrating Responsible Entrepreneurship into graphic design education may help prepare future designers to think critically, act responsibly, and navigate an increasingly complex and AI-influenced design landscape.

KEYWORDS | ENTREPRENEURIAL COMPETENCIES, GRAPHIC DESIGN EDUCATION, RESPONSIBLE ENTREPRENEURSHIP, EXPERIENTIAL LEARNING, SUSTAINABLE DESIGN

1. Introduction

As graphic design evolves within the context of artificial intelligence, designers' roles increasingly extend beyond aesthetic concerns, calling for critical thinking, adaptability, and meaningful engagement with current societal challenges (IcoD, 2020; Muratovski & Handford, 2025). This transition emphasizes the increasing need to equip students with the skills required to navigate the complexities of a rapidly evolving world (Noel, 2020).

Recognizing this need, the author's doctoral research explored how design education can cultivate entrepreneurial skills among graphic design students, while fostering a stronger sense of responsibility in their professional practice. Integrating an entrepreneurial mindset into educational practices can also lead to positive outcomes, such as greater perseverance, improved career direction, and enhanced motivation and self-confidence (Surlemont & Kearney, 2009). Moreover, Entrepreneurship extends beyond the classroom, fostering lifelong learning by equipping students with key competencies essential for personal growth, social inclusion, active citizenship, and employability (Bacigalupo et al., 2016).

Traditional graphic design education tends to focus on responding to client briefs, which may limit students' ability to develop the autonomy and strategic thinking required to independently identify and define complex problems (Haylock, 2020). This paper examines gaps in graphic design education as revealed through students' perceptions of their entrepreneurial competencies, and explores how a tailored, reflective, and hands-on learning experience can address these gaps by strengthening students' agency and their capacity to design sustainable solutions.

2. Context

As part of the author's doctoral research, a learning experience was designed using a mixed methods research approach to investigate how graphic design students can be supported in developing their agency by integrating social and environmental considerations into their design projects (Raîche-Savoie et al., 2025). This experience took the form of a creative retreat for graphic design students at Cégep de Sainte-Foy, co-designed with the stakeholders to reflect their preference for an immersive learning environment beyond the traditional classroom setting (Raîche-Savoie, 2024). Held from January 6–10, 2025, at a cultural organization in Québec City, Canada, the retreat brought together 12 students from first to third year, and was led by the author in the role of facilitator, alongside a recreational activities technician specializing in Entrepreneurship. The activity blended theoretical and practical components, focusing on Responsible Entrepreneurship—addressing social, environmental, and economic responsibility, as well as ethical decision-making. Responsible Entrepreneurship integrates social, environmental and economic considerations into value creation, whether for business ventures, one-time projects, or civic initiatives (Pepin et al., 2017). Students participated in self-paced online modules, integrating multimedia content and case studies. Practical workshops encouraged hands-on exploration, with individual work sessions following the Pomodoro technique and collaborative team activities structured around the Design Thinking process. Participants developed their personal projects while benefiting from structured guidance and access to specialized tools, such as a risograph, screen-printing equipment, and bookbinding tools. With a participation fee of $100 CAD, financial support from institutional contributors ensured accessibility. The retreat aimed to cultivate entrepreneurial competencies, empowering students to create sustainable and ethical design projects while fostering creativity, self-reflection, and responsible design practices.

3. Methodology

On the first day of the creative retreat, students engaged in a self-evaluation of their entrepreneurial competencies and identified the ones they aimed to develop throughout the week (Table 1). These competencies and their descriptions were provided by the institution's Entrepreneurship office (BIE, 2022) and are grounded in the EntreComp – Entrepreneurship Competence Framework (Bacigalupo et al., 2016). This framework defines Entrepreneurship as a key lifelong learning competence and organizes it into three interrelated areas, each encompassing five competencies, for a total of 15.

Table 1. The 15 entrepreneurial competencies inspired by the EntreComp – Entrepreneurship Competence Framework (BIE, 2022).

Areas	Competencies	Descriptions
Ideas and Opportunities:	1. Identifying Opportunities	I know how to identify opportunities to create new products, services, or projects to meet the needs of my environment.
	2. Expressing Creativity	I am able to develop new ideas. For example, I find it easy to come up with original solutions to new or existing challenges.
	3. Demonstrating Vision	I find it easy to visualize ideas that could turn into potential actions.
	4. Leveraging Ideas	I am able to recognize the potential of an idea and identify the best ways to leverage it.
	5. Thinking Ethically and Sustainably	I know how to assess the social, economic, and environmental impacts of my ideas and actions.
Resources:	6. Being Able to Mobilize Resources	I am able to seek out the resources and skills I need (e.g., material, technological, financial, human) and ensure their effective management.
	7. Demonstrating Motivation and Perseverance	I know how to demonstrate patience and perseverance when facing pressure, unexpected situations, and challenges.
	8. Having Strong Self-Awareness and Self-Efficacy	I recognize my strengths and know how to leverage them. I am also aware of my limitations and strive for continuous development.
	9. Possessing Financial and Economic Knowledge	I know how to evaluate costs, plan, and manage the financial aspects of a project.
	10. Inspiring and Mobilizing Others	I know how to present my ideas enthusiastically and encourage others to engage in my project.
Into Action:	11. Taking Initiative	I am responsible and autonomous. I know how to take on challenges and take action.
	12. Planning and Managing a Project	I find it easy to set priorities, organize tasks, and ensure follow-ups.
	13. Adapting to Ambiguity, Uncertainty, and Risks	I know how to make decisions and take action despite the ambiguity, uncertainty, and risks associated with my project.
	14. Collaborating with Others	I know how to work in a team despite differing perspectives and develop my professional network.
	15. Learning from Experience	I find it easy to learn from others, as well as from my successes and failures.

As part of a quantitative data collection, students completed an interactive PDF questionnaire outlining 15 entrepreneurial competencies and their descriptions. They rated their alignment with each competency on a scale from 1 to 4: 1 meaning "not at all," 2 "a little bit," 3 "moderately," and 4 "a lot" (Figure 1). These PDFs were collected at the end of the week, with 11 out of 12 students submitting their completed questionnaires to the author.

Habiletés pour entreprendre

Échelle : *Ça ne me ressemble...* / *1- pas du tout* / *2- un peu* / *3- modérément* / *4- beaucoup*

Idées et opportunités	1	2	3	4
1- Identifier les opportunités *Je sais cibler des occasions pour créer de nouveaux produits, services ou projets afin de répondre à des besoins de mon environnement.*	○	○	●	○
2- Exprimer sa créativité *Je suis en mesure de développer des idées nouvelles. Par exemple, j'ai de la facilité à trouver des solutions originales à des nouveaux défis ou à des défis déjà existants.*	○	○	○	●
3- Faire preuve de vision *J'ai de la facilité à visualiser des idées qui pourraient se transformer en actions potentielles.*	○	○	●	○
4- Exploiter ses idées *Je suis en mesure de reconnaître le potentiel d'une idée et d'identifier les meilleures façons d'en tirer profit.*	○	○	●	○
5- Avoir une pensée éthique et durable *Je sais évaluer les impacts sociaux, économiques et environnementaux de mes idées et de mes actions.*	○	●	○	○

Ressources	1	2	3	4
6- Être en mesure de mobiliser des ressources *Je suis en mesure d'aller chercher les ressources et les compétences dont j'ai besoin (ex. matérielles, technologiques, financières, humaines) et d'en assurer une bonne gestion.*	○	○	●	○
7- Manifester de la motivation et de la persévérance *Je sais faire preuve de patience et de persévérance face à la pression, aux imprévues et aux difficultés.*	○	○	●	○
8- Avoir une bonne connaissance de soi et de son auto-efficacité *Je sais reconnaître mes forces et en tirer profit. Je connais aussi mes limites et aspire à continuer de me développer.*	○	○	○	●
9-Détenir des connaissances financières et économiques *Je sais évaluer les coûts et effectuer la planification et la gestion financière d'un projet.*	○	●	○	○
10- Inspirer et mobiliser les autres *Je sais présenter avec enthousiasme le contenu de mes idées et amener les autres à s'engager dans mon projet.*	○	○	●	○

Mise en action	1	2	3	4
11- Prendre des initiatives *Je suis responsable et autonome. Je sais relever des défis et me mettre en action.*	○	○	○	●
12- Savoir planifier et gérer un projet *J'ai de la facilité à déterminer les priorités, à organiser le travail et à en assurer le suivi.*	○	○	●	○
13- S'adapter face à l'ambiguïté, l'incertitude et les risques *Je sais prendre des décisions et passer à l'action malgré l'ambiguïté, l'incertitude et les risques associés à mon projet.*	○	○	●	○
14- Travailler en collaboration avec les autres *Je sais travailler en équipe malgré les divergences de vision et développer mon réseau de relations professionnelles.*	○	○	○	●
15- Apprendre de son expérience *Il est facile pour moi d'apprendre des autres, de mes succès et de mes échecs.*	○	○	○	●

Note : *Cette auto-évaluation a été développée en collaboration avec l'équipe des conseillers et conseillères d'orientation du Cégep de Sainte-Foy, à partir du modèle EntreComp (Bacigalupo, Kampylis, Punie et Van den Brande, 2016).*

Figure 1. Example of the interactive PDF questionnaire that was filled by one of the students.

4. Results and Analysis

The data collected from each student's questionnaire, detailing their self-assessed competency ratings, was systematically compiled and organized into the following table (Table 2). This table provides a clear overview of how students ranked their proficiency in each of the 15 entrepreneurial competencies, allowing for a comparative analysis of their strengths and areas for growth. By aggregating these individual responses, patterns and trends emerged, offering valuable insights into which competencies students felt most confident in and which ones required further development.

Table 2. Students' self-evaluations of each of the 15 entrepreneurial competencies.

Competencies	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
1. Identifying Opportunities	4	3	2	3	2	2	4	3	3	3	1
2. Expressing Creativity	4	4	3	3	3	4	2	2	3	4	4
3. Demonstrating Vision	4	3	3	4	2	2	3	2	4	3	2
4. Leveraging Ideas	3	4	3	4	3	3	2	2	2	3	4
5. Thinking Ethically and Sustainably	2	1	2	3	3	2	4	2	2	2	2
6. Being Able to Mobilize Resources	3	3	2	3	1	2	3	3	1	3	2
7. Demonstrating Motivation and Perseverance	4	4	3	3	3	3	3	3	2	3	3
8. Having Strong Self-Awareness and Self-Efficacy	4	4	1	4	3	3	1	3	4	4	3
9. Possessing Financial and Economic Knowledge	2	1	1	2	1	2	2	1	1	2	1
10. Inspiring and Mobilizing Others	4	2	2	4	2	1	4	4	3	3	3
11. Taking Initiative	4	3	2	4	2	3	3	3	1	4	3
12. Planning and Managing a Project	3	2	1	3	2	2	2	4	2	3	1
13. Adapting to Ambiguity, Uncertainty, and Risks	4	4	1	3	1	3	3	3	1	3	2
14. Collaborating with Others	4	3	3	4	3	2	3	3	1	4	2
15. Learning from Experience	4	3	4	4	3	4	4	4	3	4	4

The average score for each of the 15 entrepreneurial competencies was calculated and ranked in descending order, from the most to the least representative of students' competency levels (Table 3). The analysis of the questionnaire results shows that the competency students identified with the most was *Learning from Experience*, indicating their ease in learning from others, as well as from their successes and failures. Among the 11 students, 8 rated this competency at the highest level (4), meaning they strongly related to it. The second highest-rated competency was *Expressing Creativity*. Students felt confident in their ability to generate new ideas and develop original solutions to both new and existing challenges. However, responses varied: 5 students strongly identified with this competency (*a lot*), while 4 rated it as *moderate*, and 2 as *a little bit*.

Finally, the competencies least identified by students were *Thinking Ethically and Sustainably* and *Planning and Managing a Project*, both ranking at the same level. Before the creative retreat, students faced challenges in evaluating the social, economic, and environmental impacts of their ideas and actions. They also struggled with setting priorities, organizing tasks, and managing project follow-ups. The lowest-ranked competency was *Possessing Financial and Economic Knowledge*. Students found it particularly difficult to assess costs, create financial plans, and manage the economic aspects of a project, highlighting a key area for further development.

Table 3. From the most to the least recognized competencies by students.

Competencies	Average
15. Learning from Experience	3,72
2. Expressing Creativity	3,27
7. Demonstrating Motivation and Perseverance	3,09
8. Having Strong Self-Awareness and Self-Efficacy	3,09
4. Leveraging Ideas	3
3. Demonstrating Vision	2,9
10. Inspiring and Mobilizing Others	2,9
11. Taking Initiative	2,9
14. Collaborating with Others	2,9
1. Identifying Opportunities	2,73
13. Adapting to Ambiguity, Uncertainty, and Risks	2,54
6. Being Able to Mobilize Resources	2,36
5. Thinking Ethically and Sustainably	2,27
12. Planning and Managing a Project	2,27
9. Possessing Financial and Economic Knowledge	1,45

5. Discussion

The quantitative findings from the self-assessment questionnaire offered an initial overview of students' perceived entrepreneurial competencies; however, it is through the qualitative examination of the creative retreat that these results acquire greater depth and meaning. By analyzing the retreat as a learning environment, this section provides a more nuanced understanding of how students might have engaged with these competencies in practice.

Students' recognition of *Learning from Experience* as their strongest competency underscores the importance of immersive, hands-on learning experiences that encourage critical reflection and personal growth. By engaging in personal projects, making decisions, and facing challenges, students participating in the creative retreat could have developped a deeper understanding of their own learning processes. The creative retreat also provided an excellent opportunity for students to develop their second highest-rated competency, *Expressing Creativity*. Unlike their usual assignments in the Graphic Design program, where they often execute a client's vision, this retreat allowed them to take full ownership of their projects. Students had the freedom to work on self-initiated projects, enabling them to focus on ideas that genuinely interested them. Rather than merely responding to a predetermined brief, they identified problems and

explored innovative solutions. Haylock (2020) highlights that problem formulation is a crucial aspect of the design process, yet it has historically been overlooked in graphic design education and practice. Furthermore, traditional graphic design education does not emphasize human-centered design to the same extent as UX/UI design. This shift from task execution to proactive problem-solving, with a focus on diverse stakeholders, may have enabled students to develop their agency and to engage more critically with their design practice, thereby reinforcing the broader role of graphic designers in addressing complex challenges.

This learning experience also provided an opportunity to enhance the competencies students identified as their weakest, including *Ethical and Sustainable Thinking*, *Project Planning and Management*, and *Financial and Economic Literacy*. In relation to ethics and sustainability, Valencia et al. (2021) describe the early stage of a designer-entrepreneur's mindset, referred to as "the artisan," as one that prioritizes personal expression over the needs of users and stakeholders. At this stage, students working on personal projects are primarily driven by their curiosity to experiment with materials, technologies, forms, textures, and aesthetics. As a result, they do not naturally consider the broader social, environmental, and economic implications of their creations. Encouraging students to integrate ethical and sustainable thinking into their design process requires exposing them to real-world challenges, fostering a sense of responsibility, and equipping them with frameworks that promote conscious decision-making in their creative practice.

The gaps in competencies related to *Project Planning and Management* and *Financial and Economic Literacy* have also been highlighted by other design researchers. Anderson (2014) argues that many graphic designers lack the necessary knowledge and experience to transform their creative ideas into viable projects. She emphasizes that developing key skills—such as financial literacy, risk assessment, and project planning—is essential for designers aiming to take their concepts from ideation to execution. Successfully managing a project requires a shift in mindset, moving beyond creative exploration to incorporating strategic thinking. Without this foundation, designers may struggle to sustain their projects, secure funding, and navigate the complexities of bringing their ideas to life.

From the start, the creative retreat was designed to support students in developing and managing a personal project while incorporating ethical, sustainable, and financial considerations into their design process. Throughout the creative retreat, students were encouraged to critically assess their social, environmental, and economic responsibilities in relation to their projects. The module on *Social Responsibility* explored issues such as race, gender, sexuality, and social mobility, prompting students to reflect on how their designs influence and represent society. The *Environmental Responsibility* module provided insights into sustainable materials and methods to minimize the ecological impact of design, encouraging students to make thoughtful material choices and consider the broader environmental footprint of their work. The third module, *Economic Responsibility*, emphasized the importance of achieving a break-even point that could extend beyond financial profit, focusing on the value of fostering community relationships. Students were prompted to critically examine market potential and production costs, integrating these considerations into their projects. The final and fourth module, *Awareness and Decision-Making*, introduced the *Ethical and Sustainable Thinking Canvas*, developed by the Entrepreneurship Office at Cégep de Sainte-Foy. This tool may have helped students assess the broader impact of their decisions by balancing social, environmental, and economic priorities. It may also have guided them in selecting more sustainable solutions, prioritizing actions based on ethical considerations, and monitoring outcomes to refine their strategies, with the aim of minimizing negative

impacts while maximizing positive results.

Beyond the theoretical modules, students participated in daily team-based sessions to apply Design Thinking, following the classic process of Empathy, Definition, Ideation, Prototyping, and Testing (Brown, 2008). This hands-on approach may have fostered collaboration and problem-solving, while also enabling graphic design students to refine and articulate design problems prior to developing solutions. By prioritizing empathy, students may have gained a deeper understanding of user needs and stakeholder perspectives, potentially enhancing their ability to create more meaningful, human-centred designs.

6. Conclusion

By first identifying gaps in entrepreneurial competencies within graphic design education, this paper examines the potential of an immersive learning experience to support the development of these competencies among graphic design students. The creative retreat offered a distinctive context in which students could engage in self-directed projects, reflect on their creative and professional practices, and develop skills extending beyond technical design execution. Through the integration of theoretical content and hands-on exploration, students were encouraged to critically consider the social, environmental, and economic implications of their work, underscoring the relevance of Responsible Entrepreneurship in contemporary design practice.

The entrepreneurial competencies identified by students as less developed—such as *Thinking Ethically and Sustainably*, *Planning and Managing a Project*, and *Possessing Financial and Economic Knowledge*—highlight areas where traditional graphic design education may benefit from additional pedagogical support and more structured learning opportunities.

Building on these findings, future research could explore how this immersive learning experiences may influence the development of entrepreneurial competencies over time. Longitudinal studies might help examine whether integrating Responsible Entrepreneurship into graphic design education is associated with sustained changes in students' competencies and professional postures. In a design landscape increasingly shaped by complexity and artificial intelligence, preparing designers to think critically, act responsibly, and frame problems rather than simply execute solutions may be essential to the future relevance of the discipline.

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From binary relationships to multi-stakeholder engagement: The evolving role of design intervention in waste classification public service transition

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ABSTRACT | As global urbanization accelerates, the demand for waste classification public services has risen sharply. However, traditional design interventions have struggled to resolve inefficiencies in waste classification services, mainly due to low public awareness and limited resources. In response, multi-stakeholder waste classification public services have emerged as a promising solution, aiming to improve service quality through increased participation, collaboration, and interaction among public agencies, design organizations, and the general public. While existing research has extensively examined the role and value of design interventions in conventional public services, the impact of multi-stakeholder involvement on the role of design in waste classification services remains underexplored and requires further study.

This study adopts a case study methodology, selecting three instances of waste classification public services to analyze the processes of design intervention in multi-stakeholder contexts. Based on this analysis, this research proposes the "Multi-Stakeholder Public Design Ladder," a conceptual framework defining three hierarchical roles of design: Design as Solution, Design for Empowerment, and Design for Cohesion. As design involvement deepens, its impact expands progressively, evolving from providing solutions to enhancing service capacity and ultimately strengthening stakeholder relationships.

This research contributes a theoretical framework for analyzing and defining the roles of design interventions in future waste classification public services. Additionally, it

encourages design teams and designers to reevaluate their roles and stakeholder relationships, preparing them to effectively navigate the rapid transformation of public services.

KEYWORDS | Public Design, Waste Classification, Co-production, Sustainability, Public Service Transformation

1. Introduction

The rapid growth of the global urban population has intensified urbanization, significantly increasing the volume and rate of solid waste generation. According to World Bank estimates, approximately one-third of global waste is improperly managed, resulting in serious environmental damage and substantial economic losses (Kaza & Yao, 2018). These issues have raised significant concerns, leading to the formal incorporation of waste management into institutional regulatory frameworks (Anderfuhren-Biget et al., 2010). Waste classification, as the initial stage of the waste management process, has therefore become a foundational component of modern public services.

Design has long played a central role in shaping and innovating public services. Traditional design research has mainly focused on the interaction between the public sector and design thinking (Clarke & Craft, 2019) or service design (Xin & Cao, 2014), highlighting their binary dynamics. However, traditional theories of design interventions in public services are increasingly being challenged. Rising demands from citizens and businesses, combined with governments' limited knowledge resources and shifts in urban governance, industrial progress, and environmental crises—particularly in waste classification—have driven various stakeholders (public, private, and co-production sectors) to engage in diverse forms of participation in waste management. Such involvement is essential for enhancing public service quality. Therefore, given the ongoing shift in public service delivery, it is necessary to re-evaluate the role of design interventions in multi-stakeholder public services.

This paper examines three case studies of multi-stakeholder participation in public waste management services, analyzing the role of design and the impact of such interventions across the four stages of the public service lifecycle. This analysis provides deeper insights into how design responds to challenges and transformations in public service delivery, thereby broadening the scope of design theory research in this field.

2. Background

2.1. The Evolution of Public Waste Classification Services

Waste management, governed by public authorities, constitutes a core component of contemporary public services (Simon et al., 2010). The provision of waste management services as a public function dates back to the enactment of the "Nuisance Removal and Disease Prevention Act" of 1846 by the Metropolitan Board of Works in London, and continues to evolve to the present day (Wilson, 1976). Given the changes in urban governance, sustainable industrial development, and ongoing environmental crises, there

is a growing demand for reforms in public waste management services. At the forefront of these reforms, waste classification has emerged as a pivotal method for enhancing waste management practices and acting as a catalyst for transformative change. This transformation occurs in three distinct phases: traditional governance-driven waste classification, market-driven waste classification, and social participation and co-production-driven waste classification.

In the traditional governance phase, government entities assume the primary responsibility for service provision, with policy governance as the predominant strategy. Local governments focus on "top-level design" and "pragmatic innovations" within the existing institutional framework. However, scholars have critiqued the limitations of formalization and the inconsistent implementation of policies during this phase (Teets & Hasmath, 2020).

The market-oriented phase, influenced by the New Public Management paradigm, is characterized by increased organizational participation in public services. However, the concept of "bounded rationality" may hinder innovation in cross-sector collaborations, and a narrow performance management system may struggle to adequately facilitate stakeholder dialogues (Simon, 1989; Dorst, 2015; Smith & Raven, 2012).

In the phase marked by social participation and co-production, co-production becomes a central concept. It involves the collaboration and interaction of diverse social actors, particularly non-expert participants, in the delivery of public services (Nabatchi et al., 2017). As waste classification services evolve, the roles of societal actors become increasingly distinct, underscoring the significance of social participation and co-production in transforming public waste management practices (Wang, 2019).

2.2. Innovation and Design Intervention in Waste Classification Public Services

The transition of waste classification public services from traditional governance to co-production necessitates innovation in public services. Design, recognized as a key driver of innovation, has consistently played a significant role in the public service sector. A foundational concept in this regard, introduced by Rittel and Webber, is the notion of "wicked problems," which they coined to describe complex, persistent social and environmental issues in the public domain (Rittel & Webber, 1973). This concept emphasizes the embeddedness, dynamism, interconnectedness, and complexity of such issues. Additionally, contemporary design theories focus on design's potential to empower organizations and influence strategic shifts (Design Commission, 2014), operate across disciplines and professions (Norman & Stappers, 2015; Dorst, 2015; Van der Bijl-Brouwer, 2019), drive social innovation and cultural ecosystems (Ezio, 2015), and facilitate systemic change (Jones, 2014; Irwin, 2015). These theories collectively expand the scope of design beyond its traditional boundaries, extending into the broader public sphere.

In response to wicked problems, Buchanan further developed design through his influential four-stage design theory, which has become central to design thinking. This theory addresses different levels of “placement” in solving wicked problems, ranging from fundamental elements such as symbols and visual communication to the creation of

artifacts and services, and ultimately to managing complex systems and environments (Buchanan, 1992).

Building upon this four-stage framework, the Danish Design Centre introduced the Danish Design Ladder in 2003 (Doherty et al., 2014). This model captures the diverse applications of design across varying levels in both business and public sectors (Ramlau, 2004) and has gained broader applicability within the general public domain. Extending this concept, the UK Design Council and other scholars introduced the Public Design Ladder and the Non-Profit Design Ladder, focusing specifically on the public and non-profit sectors (UK Design Council, 2013; Nusem et al., 2017). The Public Design Ladder outlines three key stages: design for discrete problems, design as capability, and design for policy (Figure 1). These stages reflect the increasing significance of design in the public sector as its engagement deepens (Design Commission, 2014).

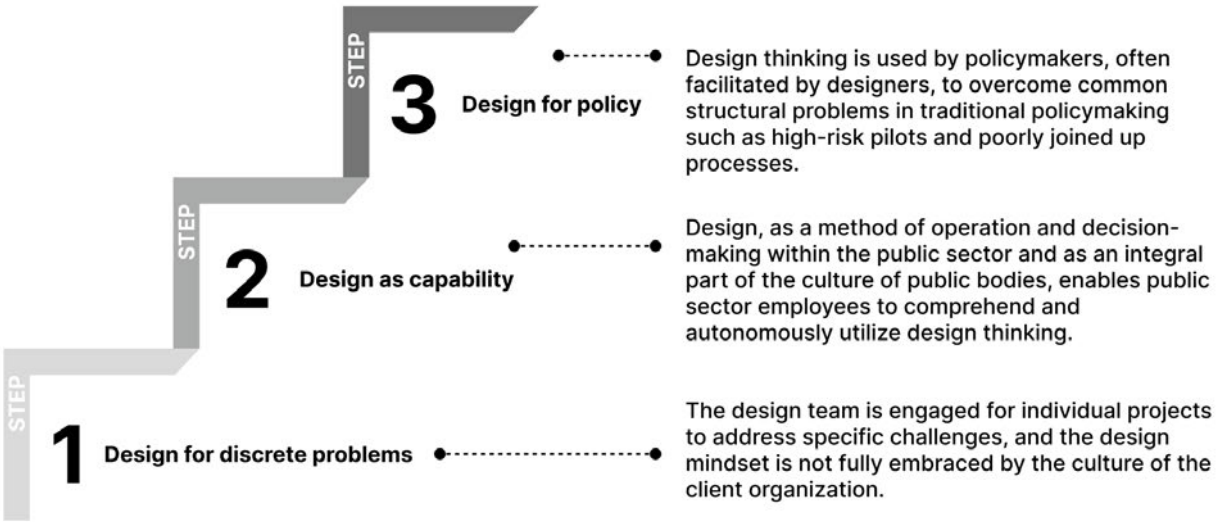

Figure 1. "The Public Design Ladder" of public services.

3. Research Methodology

This study adopts a case study approach to examine the extent of design intervention in public waste classification services and to refine the "public design ladder" within a multi-stakeholder context through an analysis of three cases in China. For confidentiality, real organizations were anonymized using pseudonyms (Company B, Company T, Company Z, Community K, Community P, Governmental Foundation H, and DT Primary School), which will be consistently referenced throughout this study.

During data collection, researchers spent ten weeks conducting 1–2 semi-structured interviews with each of the project experts and designers involved in the selected cases. The interview protocols were tailored to the characteristics of each project, resulting in approximately six hours of recorded material (Table 1). Subsequently, researchers dedicated two additional weeks to supplement case data through a review of project records and publicly available materials, further enriching the dataset.

Table 1. Case Descriptions and Interview Details.

Case	City	Stakeholders	Interviewee	Interview duration
1	Changsha, China	•Company B; •Community K; •Community Residents	Project Management	2.5h
2	Changsha, China	•Company T; •Community P; •Community Residents	Project Leader	2h
3	Shenzhen, China	•Foundation C; •Company Z; •DT Primary School	Project Designer	2h

During case analysis, the interview data were transcribed and thematically coded using NVivo 15. The coding outcomes underwent expert validation and finalization through a consensus-based process. The interview analysis revealed that all three cases demonstrated characteristics typical of public service projects. Accordingly, this section employs the four-stage public service lifecycle framework—Co-Commissioning, Co-Design, Co-Delivery, and Co-Assessment (Nabatchi et al., 2017)—to evaluate the application and impact of design interventions.

4. Case Study on Design Intervention Models in Waste Classification Public Services

4.1. Case 1: "Three-network Integration" Waste Recycling System Design

Case 1 analyzes an entrepreneurial initiative on waste classification spearheaded by technology company B, located in Hunan Province. In this project, Company B engaged designers and partnered with the district government and Community K residents to co-create, design, and implement a waste classification, collection, and recycling system. This system incorporates three interconnected networks: the "Recycling Resources Network," the "Classified Collection Network," and the "IoT Data Network" (Figure 2). To gain a comprehensive understanding of the process, this study conducted an in-depth interview with the project manager.

Figure 2. Waste classification, disposal and recycling system.

4.2. Case 2: Self-Service Waste Classification System

In Case 2, the T Company team, leveraging its expertise in product development, integrated design thinking principles, including user experience, into the project. They designed a community-based waste classification and disposal system to foster residents' waste classification behaviour and improve the operational efficiency of Community P's staff. The study interviewed a project team member responsible for project advancement, possessing expertise in development and product management.

4.3. Case 3: Zero Waste Campus Design

Case 3 examines a project commissioned by the H Governmental Foundation, wherein design consultancy firm Z was tasked with promoting waste-free behaviour among students at DT Elementary School in Shenzhen (Figure 3). This study interviewed the lead designer overseeing the project at Z Consultancy.

Figure 3. Guidance design for waste classification behaviour and supportive devices for waste classification behaviour are provided to students.

5. Result

This study examines three cases of multi-stakeholder participation in waste classification public services, introducing a public design ladder distinct from traditional public service models. The proposed design ladder illustrates different levels of design influence in public services involving multiple stakeholders. Table 2 presents the public design ladder for multi-stakeholder participation in public services, delineating three stages of design influence.

Table 2. Design interventions in the four stages of the public service lifecycle across three cases.

Case	Co-commissioning	Co-Design	Co-Delivery	Co-Assessment	Public Design Ladder of Multi-stakeholder
1	Less Design Participation	•Design requirements clarity •Preliminary work by other departments •Passive design role •Solving specific needs	Less Design Participation	Less Design Participation	**Design as solution**
2	•Internal capacity building through design thinking •Recognizing and enabling active user roles	•Final design output •Improving systems and tech •Enhancing user engagement through accessible tools	Less Design Participation	Less Design Participation	**Design for empowerment**
3	•Collaboration with public and private actors •Design as a bridge	•Design inspiration from other regions •Behavior change through guidance	•Interactive feedback with users •Iterative design process •Bringing stakeholders together	Less Design Participation	**Design for cohesion**

Through an analysis of multi-stakeholder waste classification cases, the original "Public Design Ladder" has been revised and extended to encompass services with multiple stakeholders (Figure 4).

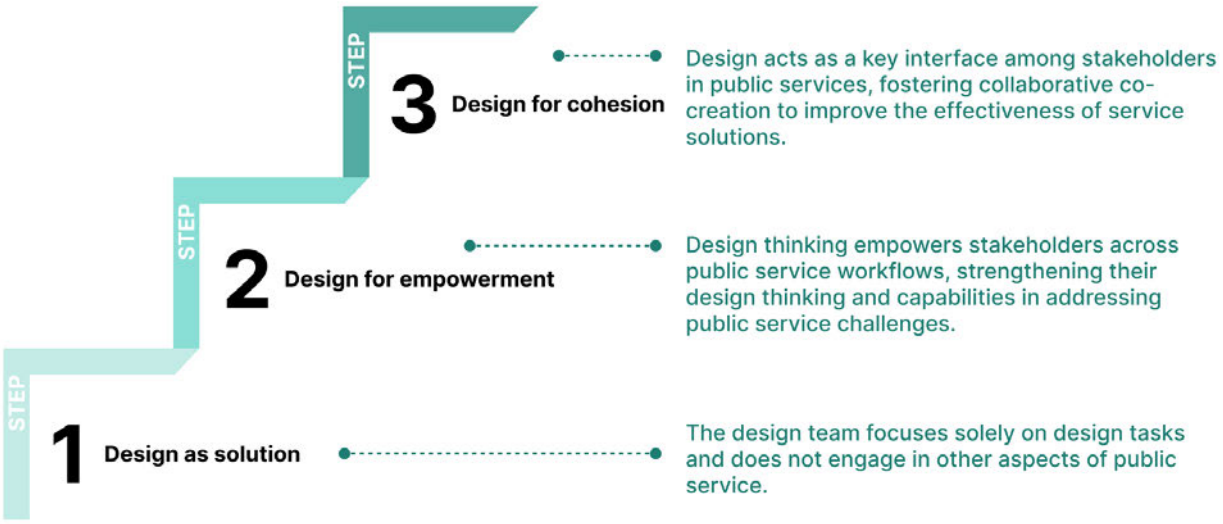

Figure 4. "The Public Design Ladder" of multi-stakeholder public services.

In the original ladder, each tier signifies the extent to which design is integrated within public institutions, demonstrating its growing adoption across different levels. The progression follows a trajectory from "Design Thinking Not Embedded in Commissioning Organizations" to "Design Becoming Part of Public Institutional Culture" and ultimately to "Design Utilized by Policymakers." In the revised framework, design has been recognized for its value to various stakeholders, evolving from "Problem-Solving Solutions" to "Empowering Stakeholders" and finally to "Enhancing Cohesion Among Stakeholders." This shift highlights that, with the engagement of multiple stakeholders, the impact of design on waste classification public services goes beyond service solutions and public institutions. Furthermore, it plays a key role in empowering stakeholders and fostering collaboration, thereby driving the systemic transformation of waste classification public services.

6. Conclusion and Further Steps

This PhD study investigates multi-stakeholder participation in waste classification public services to advance the "Public Design Ladder" framework. T The revised framework delineates three tiers: "Design as solution," "Design for empowerment," and "Design for Cohesion." As design interventions become increasingly integrated into multi-stakeholder public services,, the role expands beyond the development of design solutions, focusing on stakeholder capacity building, strengthening relationships, and ultimately contributing to the transformation of public services.

However, this study also highlights several challenges associated with design interventions in multi-stakeholder public services, including the dependence on policymakers' acceptance of design recommendations and the practical constraints designers encounter in addressing complex social issues. To overcome these challenges, future research should explore the following areas:

- First, analyzing the challenges and limitations at each stage of multi-stakeholder public service design to refine and enhance the theoretical framework.
- Second, creating specialized design tools informed by the framework to support designers in managing the complexities of multi-stakeholder public services.

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HYBRID BODIES AND DIGITAL IDENTITIES: EXPLORING TRANSHUMAN FASHION AT THE INTERSECTION OF TECHNOLOGY AND SELF.

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ABSTRACT | In a rapidly evolving landscape, fashion, through the hybridization of technology and biomechanical integration, emerges as a preeminent investigative medium, capable of questioning the understanding of what it means to be human in the postdigital era, investigating the ethical and cultural implications of this development. Thanks to advances in the design of smart materials and wearable technologies, fashion today, and even more so tomorrow, promises unique pathways for human enhancement and self-expression that transcend physical limitations, creating a context in which technology increasingly configures itself as a defining element of identity. Following the thought of transhumanist theorists, this ongoing study explores the potential of fashion, in association with wearable technologies, as a medium to augment and extend the human body, establishing a hybrid dimension where digital and biomechanical elements become integral to both personal and collective aesthetics. Through the analysis of contemporary case studies and pioneering experiments that respect the boundaries of the cyborg essence, as defined by Donna Haraway, who urges us to consider the cyborg as an icon of human-machine hybridization, this research focuses on emerging aesthetics that emphasize the application of transhumanist principles. From cyberpunk motifs, embodying the fusion of human and technological, to synthetic-organic constructs, we witness a redefinition of the complex interplay

between natural and artificial elements, compelling us to examine whether and how these aesthetics might represent a new vision of identity and corporeality.

This “beyond human” approach increasingly positions fashion as a privileged investigative tool capable of questioning our understanding of what it means to be human in the post-digital era. The ethical and cultural implications of these developments, as highlighted by Stiegler in his concept of *pharmakon*—an ambivalent symbol of both cure and poison that underscores both potential and risk—are profound.

By integrating fashion with wearable devices and biomechanical technologies, this study critically engages with themes of identity construction, inclusivity, and sustainability, probing how the fusion of natural and artificial within fashion influences our perceptions of identity and potentially redefines inclusivity in a world where technologically mediated appearances might either diminish social divides or, conversely, risk excluding those who cannot access such advancements. This investigation positions the redefinition of the hybrid body as an essential theme through which to argue the role of clothing as a true artificial second skin, thus radically redefining the very role of fashion in delineating the boundaries between natural and augmented bodies. By analyzing the application of transhumanist principles within fashion, this study explores both the promises Braidotti identifies in her posthumanist writings regarding self-expression, as well as the infinite possibilities that technologies, in their most direct influence on the human body, may offer.

KEYWORDS | HYBRID BODIES, POSTHUMAN FASHION, EMERGING AESTHETICS, WEARABLE TECHNOLOGIES, TECHNO-AESTHETIC

1. Introduction

In an era marked by rapid technological integration and ontological reconfigurations, fashion, as a material articulation of embodied discourse, emerges as a privileged conduit to interrogate the porous boundaries and onto-political metamorphoses of the human subject in the postdigital age.
As an ontological site par excellence, fashion facilitates the exploration of subjectivity's contingency, plasticity, and technogenetic transformation,

materializing what Parisi defines as *techno-aesthetics*: a sensorial regime wherein matters and code, embodiment and algorithmic abstraction, co-compose in a field of indeterminacy and modulation (Simondon, 1958; Parisi, 2013). The integration with wearable technologies reinforces the role of garments as catalysts for reconfiguring corporeality and subjectivity, aligning with postuman paradigms that envisage the body as a becoming-entity, open to expansion, hybridization, and ontological discontinuity (Sloterdijk, 2009; Barad, 2007).

The posthuman body, heralded by its closer relation with technologies, transcends formal materialization, permeating the ontological and experiential *strata* of existence. These progressive transformation let new form of aesthetics emerge and, as Wolfgang Welsch posits, they surpass passive contemplation, embracing corporeal and technological participation (Welsch, 1997). Similarly, Nicolas Bourriaud's concept of relational and *post-productive aesthetics* underscores hybridization, manipulation, and interaction as its defining characteristics (Bourriaud, 2009). The incorporation of smart technologies into garments amplifies this discourse, engendering novel aesthetic paradigms that manifest as functional and political synesthesias of the body (Deleuze & Guattari, 1980; Flanagan et al., 2020). In this light, the *augmented body* emerges as a further articulation of fashion's techno-aesthetic agency, embracing thus a trashuman dimension, able to intensify its capacity to enhance and augment the human body, his potential and his modes of experience.

In the transition from human to transhuman, fashion assumes the role of a critical techno-epistemology that interrogates the dichotomy between nature and technics, as well as the ontological status of being itself (Barad, 2007; Derrida, 1989). This study examines the emergence of hybrid, and augmented bodies in contemporary fashion production as aesthetic and political vehicles of emerging subjectivities and digital identities. Employing a transdisciplinary approach, the analysis focuses on selected case studies to elucidate the intersection of corporeality and technology within transhumanist and postdigital paradigms.

2. Wearable Technologies: The Body as an Augmented Surface

The concept of the hybrid body is rooted in the speculative trajectories of contemporary critical theory, among which Donna Haraway's vision emerges as paradigmatic for the present inquiry. In her *Cyborg Manifesto*, Haraway dislocates the binary ontology of human/machine by envisioning the cyborg as a liminal, figure: a politically charged, ontologically hybrid entity that resists essentialist constructions and opens space for transformative becoming (Haraway, 1991). Fashion, in its deep-seated complicity with the body, emerges as an epistemic interface capable of interrogating the mutability of embodied subjectivity (Cranny-Francis, 2008). However, the transhumanist project, as formulated by Max More and Natasha Vita-More, radicalizes this vision toward a techno-teleological horizon of perpetual enhancement in which the human embodies an

open-ended vector of potentiality, calibrated toward optimization and cognitive surplus (More & Vita-More, 2013).

It is in this speculative tension that Dani Clode's project "Third Thumb" finds resonance as a paradigmatic case of design informed by transhumanist logic. The project introduces a robotic, opposable sixth digit to the human hand, expanding its operative range. Not a reparative prosthesis, but an additive organon, the "Third Thumb" materializes the conceptual transition from the biologically given to the technologically sculpted, exemplifying what Simondon would call a "concretization of the technical object" in which the technical and the organic co-evolve (Simondon, 1958, p.92). The hand ceases to be an anatomical given and becomes a semiotic terrain where gesture, functionality, and identity are renegotiated. The six-fingered hand no longer signifies anatomical anomaly, but instead inaugurates a new potential morphology: the device becomes a site of ontological disobedience, destabilizing the boundaries of normativity toward what Braidotti terms a "posthuman subjectivity", embodied, relational, and ontologically incomplete (Braidotti, 2013).

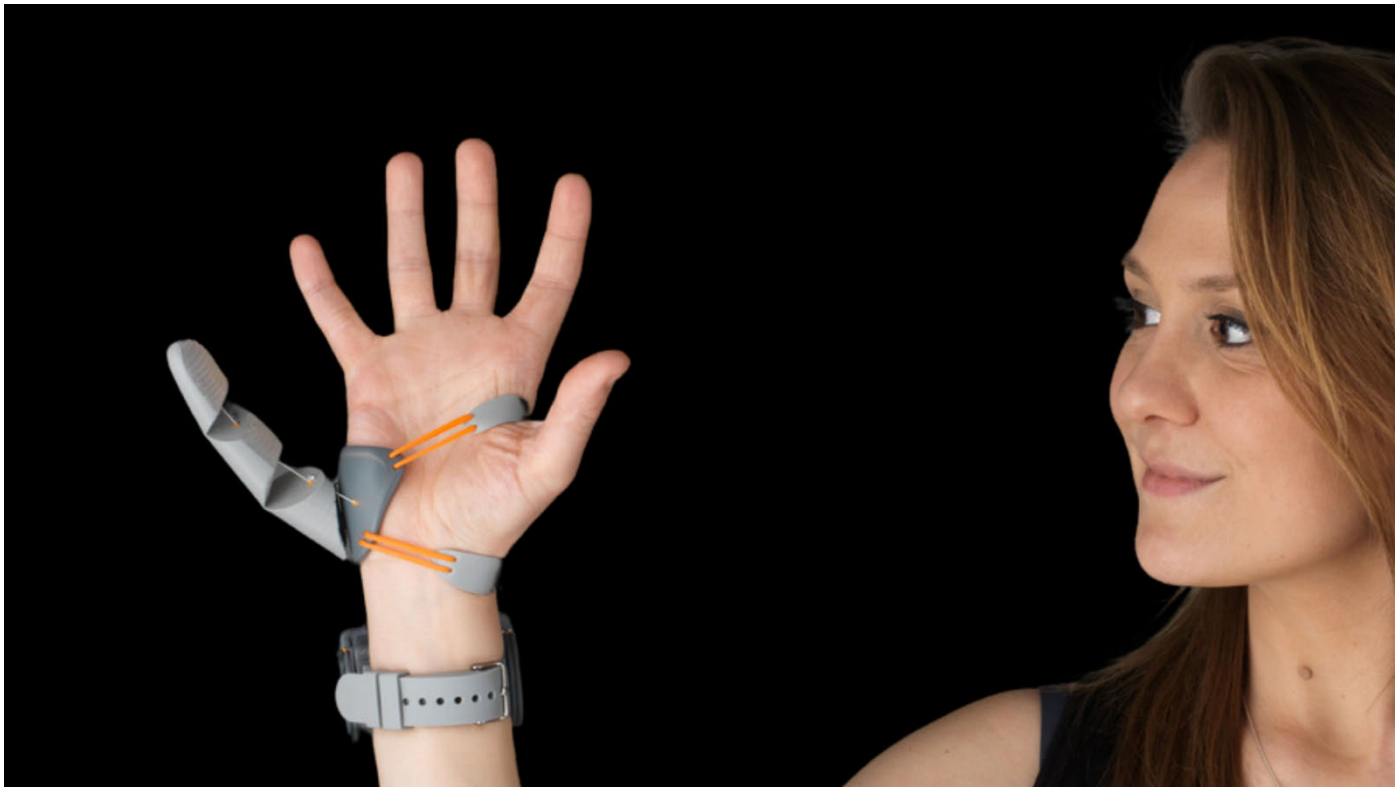

Figure 1. "Third Thumb", Dani Clode, (2017). Master's studies in Design Products at the Royal College of Art in London. The motorized thumb enables enhanced gestures, challenging anatomical norms and embodying a transhuman aesthetic of functional and morphological augmentation.

The "Third Thumb" contributes indeed to the emergence of a transhumanist aesthetics of the *non-finis*, where the body is exposed as a mutable, relational matter, open to engineering, recoding, and aesthetic appropriation (Murray, 2008; Featherstone, 2010). As Shilling notes, the contemporary body increasingly operates as an unfinished project subject to technogenesis, autopoietic design, and tactical augmentation (Shilling, 2012).

Within this continuum, Anouk Wipprecht's project "Spider Dress" stands as a singular case of wearable ontology, staging the convergence of machinic agency, somatic presence, and aesthetic semiotics. Conceived as a responsive exoskeleton equipped with biofeedback sensors and robotic appendages, the dress activates in proximity to others, mapping an affective cartography around the wearer's body (Wipprecht, 2015). The corporeal becomes a site of pre-reflective agency, wherein the garment functions as a machinic membrane, simultaneously protective and expressive, encoding affect, threat, and response without recourse to conscious deliberation. Yet Wipprecht's work departs from transhumanism: rather than celebrating technological control over the body, it invites a critical reframing of embodiment as mediated, unstable, and machinically co-constituted, generating an ontological realignment wherein the body is re-configured as an informational and semiotic field, a porous entity that is continuously shaped by its cultural milieu (Hayles, 1999).

This techno-aesthetic apparatus echoes the concept of *embodiment relation*, where technology becomes a co-actor in the constitution of experience (Don Ihde, 1990). The "Spider Dress" intervenes in perception, reframing bodily presence, grounded in relational emergence and distributed cognition. In this sense, the project resonates with the *New Aesthetic* (Bridle, 2012), a visual and material regime in which the subjectivity is co-produced in entanglements between visible bodies and opaque algorithms.

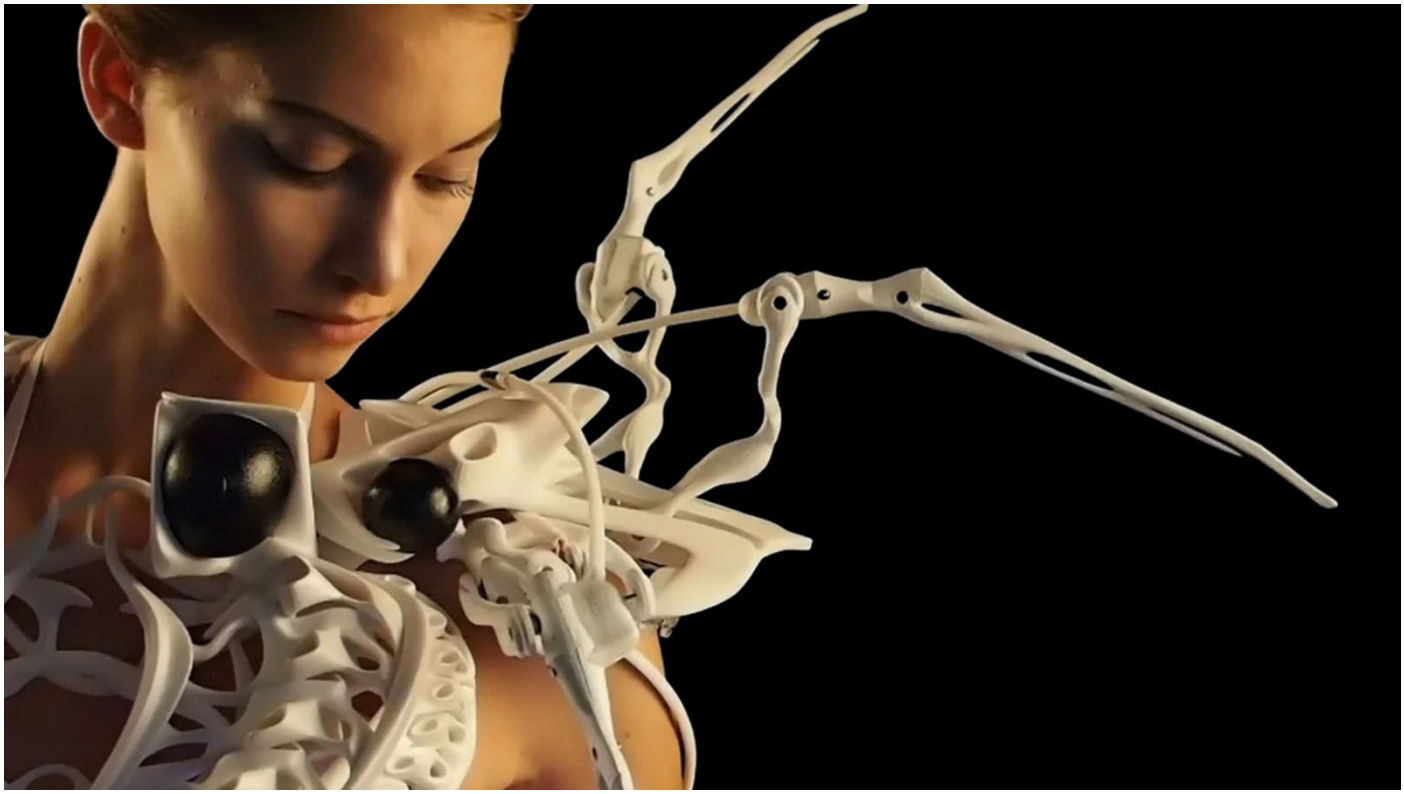

Figure 2. *"Spider Dress", Anouk Wipprecht (2015).* This robotic garment, characterized by its biomimetic aesthetics and skeletal architecture, integrates proximity sensors and kinetic structures that respond to environmental stimuli. The design visualizes a wearable defense system, where moving appendages regulate personal space.

The observed cases study substantiate the idea of rewriting the body beyond the humanist model (Barthes, 1967; Skinner, 2016): the classical canon of corporeal integrity, symmetry, proportion, and natural closure, gives way to a logic of excess, morphogenesis, and hybridization (Pugliese, 2010; Nancy, 2008). In this speculative space, fashion becomes a philosophy-in-action, staging the future of embodiment not as a given destiny, but as design.

3. **Postdigital Aesthetics**

The postdigital aesthetic landscape reveals a plurality of trajectories that reflect the increasing integration between body and technology, challenging the traditional categories of beauty, nature, and humans. Transhuman theories conceive the body as part of the project focus where computational artefacts, biotech textiles, and algorithms interact, transforming clothing into a political platform that articulates a fluid, decentered, and connective subjectivity (Musto, 2022).

Numerous projects embrace this vision: Behnaz Farahi's "Caress of the Gaze" is a reactive garment that responds to gaze, reflecting a sentient mode of wearability; Studio XO's interfaces for Björk's Biophilia Tour turn the body into a media surface, translating gesture into light and sound (Snibbe, 2011); CuteCircuit's "Hug Shirt" explores instead wearable intimacy through remote haptic feedback (CuteCircuit, 2002). Mapping the complex array of emerging fashion morphologies is a challenging endeavor that can only be approached through a radical synthesis, one that bears the risk of omitting peripheral trends or overgeneralizing inherently polyvalent forms. Acknowledging these limitations, a provisional taxonomy is proposed, aimed at identifying key traits among the most widespread emerging aesthetic paradigms.

The *cyberpunk aesthetic*, with its dystopian and hyper-technological iconography, has played a decisive role in shaping the imaginary of human-machine fusion. Thinkers such as Bukatman have emphasized its ability to mediate subjectivity within digital environments, portraying the body as a threshold between material and virtual, between individual identity and informational flux (Bukatman, 1993). In fashion, this approach translates into synthetic materials, modular structures, and designs inspired by cyber-organic contamination, as seen in the collections of Alexander McQueen and Gareth Pugh.

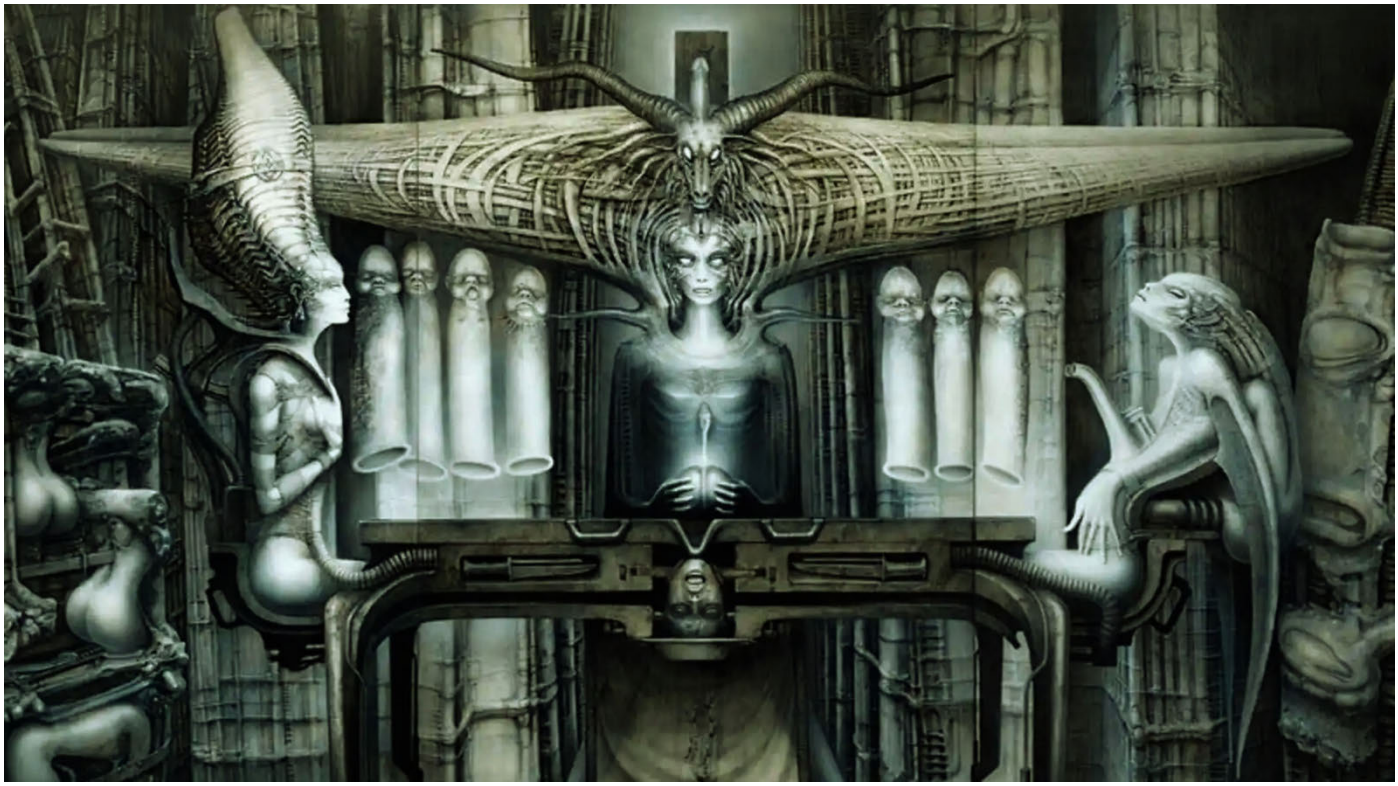

Figure 3. *Biomechanical artwork, H.R. Giger (1977).* This painting synthetised Giger's dark posthuman imaginary: a fusion of organic and mechanical forms arranged in techno-gothic symmetry. The central figure, fused with tubular prosthetics and machinic organisms, suggests the dissolution of boundaries between humans and machines. The work anticipates aesthetic tropes later explored in transhuman visual culture.

Aligned with the transhuman imaginary is the *biomechanical* paradigm, influenced by the works of H.R. Giger and critically reinterpreted in both artistic and theoretical terms (Giger, 1994). This aesthetics fuses organic and artificial elements into hybrid forms, mirroring a body increasingly colonized by technological devices. Beloff investigates analogous dynamics through the conceptual figure of the 'Hybronaut',a liminal entity navigating the interstice between the human and hybrid environments (Beloff, 2012). This figure resonates with Jean-Luc Nancy's theorization of the body as a site of ontological openness, shaped by the interplay of alterity and technē. In this framework, the body emerges as a porous interface, whose boundaries are continually negotiated and destabilized by technological mediation boundaries (Nancy, 2000).

Another aesthetic trajectory worth to menion is the *organic-digital,* perfectly expressed in the work of Iris van Herpen, who employs 3D printing, parametric simulations, and fluid materials to translate biological patterns into artificial morphologies. Van Herpen, in her collection "Biopiracy", proposes a new topology of the body, wherein surfaces become the material expression of visual algorithms, materialising Flusser's view on speculating practices in which design constitutes the grammar of technology and the language through which the post-industrial human shapes the world (Flusser, 1993).

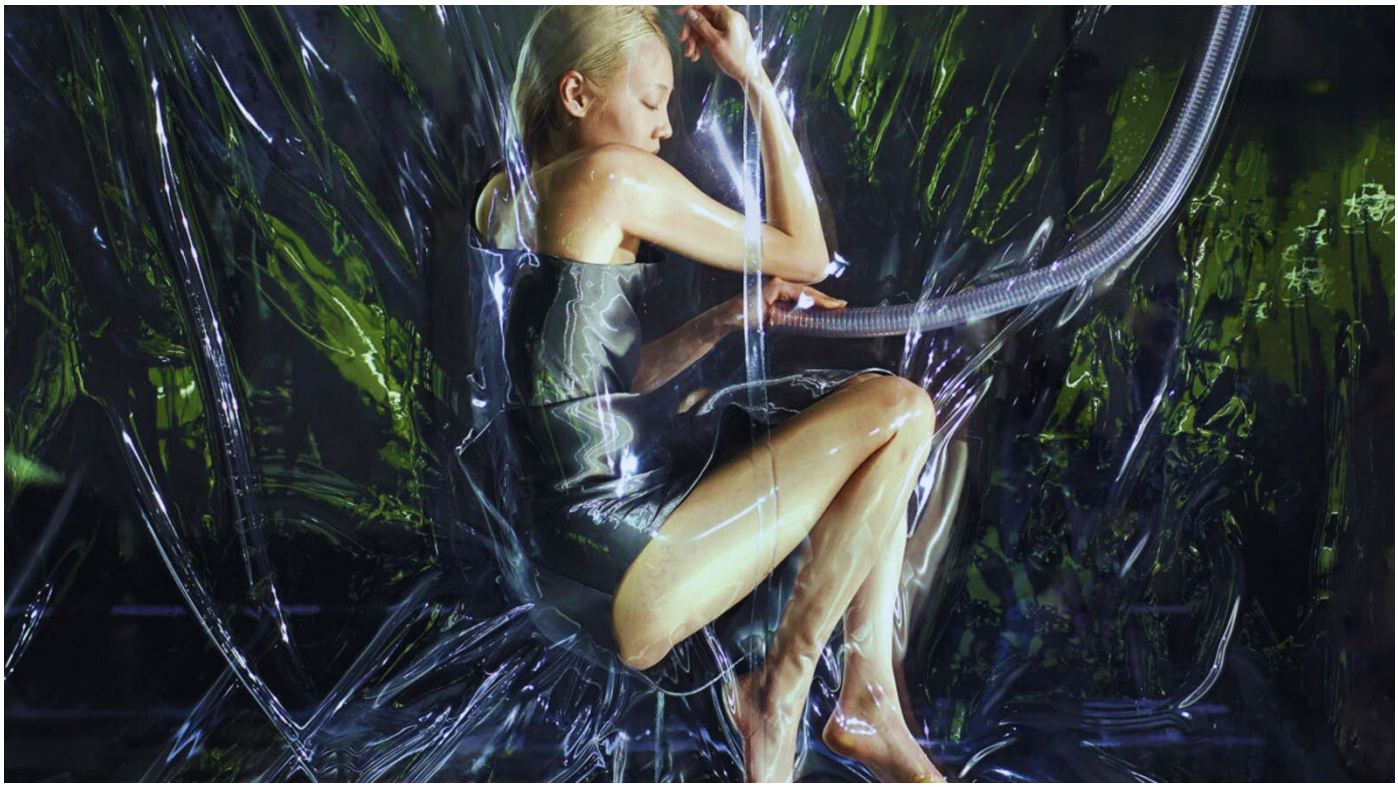

Figure 4. Iris van Herpen, "Biopiracy" Haute Couture Autumn/Winter 2014, Paris. In this collection, models were suspended in vacuum-sealed plastic membranes, visualizing the body as subject to biotechnological control and aesthetic manipulation.

A more subtle, yet equally radical, approach is that of *sensory transparency* where fashion matter is designed by biometric parameteres. In Behnaz Farahi's "Caress of the Gaze" (Farahi, 2015), the textile becomes a dialogic interface, capable of reacting to gaze of the people looking at the wearer. This aesthetic dimension occupies a space of intersection between relational aesthetics and neurodesign, wherein datas emerged from proximity emerge as design materials, reconfiguring sensori-motor perception into an embodied aesthetic of interfaces (Hansen, 2006).

These emerging design paradigms extend beyond the confines of transhumanist thought alone, and may be more aptly situated within the broader framework of posthumanist aesthetics. In this perspective, informed by Braidotti's philosophical stance, subjectivity is reconceived as inherently multiple, hybrid, nomadic, and constituted through relational processes (Braidotti, 2013). In this sense, emerging aesthetics operate as dispositifs for subject projection and production, they become the visible expression of a philosophical mutation that, as Deleuze and Guattari suggest, functions through the dismantling of the organic body and the proliferation of incorporeal potentialities (Deleuze & Guattari, 1980). Within this framework, fashion contribute propels human body into becoming.

4. Conclusions

As Bernard Stiegler states, technics is always a *pharmakon*: at once remedy and poison, instrument of individuation and vector of systemic entropy (Stiegler, 2010). Wearable technologies, inscribed within this ambivalence, oscillate between the promise of embodied empowerment and the latent risks of dataveillance, algorithmic capture, and ontological asymmetry (Flanagan et al., 2020; Maragiannis & Ashford, 2019). In this tension, fashion, understood as both medium and mode of posthuman figuration, becomes a privileged terrain for the unfolding of aesthetic-ethical critique. Through wearable apparatuses, the body becomes a liminal topology in between the organic and the machinic. As technologies infiltrate textiles, smart materials, and even the dermal thresholds of the flesh, a profound reconfiguration of corporeality emerges as a mutable relay of forces. (van Dongen et al., 2019; Cranny-Francis, 2008).

The emergent aesthetics of this technocultural milieu enact transformations of subjectivity itself. Within the horizon of postphenomenology, the technological actively participates in its becoming, mediating its temporalities and modulating its perceptual rhythms (Ihde, 1990; Ramoğlu, 2019). Fashion assume the role of a *techno-aesthesis*: a sensible regime through which cyborgian potentialities materialize. The increasing aestheticization of the wearable, evident in the reactive garments of Behnaz Farahi or the bioinspired *body-architectures* of Iris van Herpen, suggests a recursive hybridization: an entanglement of data, skin, code, and form. The body is no longer “worn” but computed, rewritten, folded into non-binary and queer epistemologies of sensibility.

Within this polyvalent landscape, contemporary aesthetics realigns itself with a revised *mimesis*, not as imitation, but as ontogenetic force: the generative *différance* of new natures and new subjectivities (Urpeth, 2001; Deleuze & Guattari, 1980). In this perspective fashion becomes a dispositif that prototypes modalities of being, prefigures unstable identities, and choreographs affective singularities. This is the task of a *sapient* fashion: not merely *smart*, but capable of critical sensation, of touching the becoming-matter of living flesh (Flusser, 1993; Hansen, 2006).

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INFORMATION AS AN EXPERIENCE: A VISUAL DESIGN APPROACH TO ETHICS FOR BUILDING MUTUAL AND RECIPROCAL RELATIONSHIPS BETWEEN RESEARCHERS AND PARTICIPANTS.

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ABSTRACT | Design and social innovation research can be defined as a relational practice that is concerned with the emergence, through applied design strategies, of new social and material relationships within a group. Establishing a relationship between the design researcher and the community based on reciprocity and mutuality is then fundamental for successful research.
This paper interrogates how this relationship is built during the recruitment phase by analysing how reciprocity and mutuality can be reached through an information design approach to ethical procedures. It focuses on the principle of *informed consent* and its role in defining the relationship between the researcher and the (potential) participants within the context of my PhD, which is a graphic ethnography exploration on how cultures of sustainability emerge in craft communities in Southwest England.
Drawing upon the original meaning of the Latin verb *informare*, "to give a shape", and defining 'consent' as a continuous conversation, I used my expertise as a visual design practitioner to create an integrated information experience that 'gives a shape to the research' to allow potential participants to have a comprehensive understanding of the project while creating the conditions for a dynamic conversation to take place.
Initial exploration showed local maker communities as heterogeneous and dynamic groups with shifting hierarchies and demographics where roles, meanings, and values are renegotiated over time, hence the necessity for an integrated information approach flexible enough to both address ethical challenges and function as a tool for constructive relationships.
The paper discusses the way this approach incorporates three fundamental elements of

the research project, the methodology (graphic ethnography), the research object (craft), and the research ethos (sustainability and accessibility) by designing ad-hoc print and web versions of participant information sheets for different audiences, accompanied by an online showcase that gives a recognisable shape to the overall project.
It concludes with preliminary observations collected through the first year of field work, and it engages with the limits and issues of creating ad-hoc information experiences to obtain consent.
As the research is ongoing, this paper does not yet give a full assessment but is meant to start a conversation on creative approaches to ethical procedures. The aim is for these to become a tool to generate solid and informed relationships between researchers and participants.

KEYWORDS | RESEARCHER-PARTICIPANT RELATIONSHIP, ETHICS, INFORMED CONSENT, PARTICIPANT INFORMATION, INFORMATION EXPERIENCE

1. Design research as a relational practice

Design and Social Innovation research is a growing field that studies whether the creation of "new ideas" such as "products, services, or models" addresses the needs of a community while allowing for new relationships and collaborations to emerge (Murray et al., 2010, p. 3), sometimes redefining those relationships by disrupting the "power relations that characterise them" (Manzini, 2019, p. 10). This approach embeds the practice of design within social structures where the design outcomes are influenced by existing cultural, economic, and political conditions. Within this framework, establishing a mutual and reciprocal relationship between the researcher and the participants in a social design project becomes essential for the project's success (Petrella et al., 2020).
This paper interrogates how a design approach to the production of participant information (PI) documents can help building a reciprocal and mutual relationship between the designer and community members during the process of recruiting and obtaining informed consent. It discusses the information experience designed in the context of my PhD, where the necessity of building a relationship from scratch with the members of maker communities in Devon, UK, and the demographic and cultural heterogeneity of these communities required a creative, flexible, and accessible approach to the design of PI materials.

2. Ethics: principles, protocols, and design

Navigating ethics in research settings requires a balance between regulations to assure the integrity and legality of the study, and the unique context-dependent issues related to societal and personal moral values (Association of Social Anthropologists of the UK, 2022). Design and social innovation research presents a third layer of challenges that are associated with the creation and deployment of design artefacts. In design ethics, current discussions are centred around principles of inclusivity, accessibility, and plurality that call for a more reflexive design practice (Costanza-Chock, 2020; Escobar, 2018; Place, 2023; Tunstall, 2023) where design is criticised when it fails to recognise limits and biases embedded in its process, but is also framed as a tool to navigate and solve social and environmental issues.

This paper positions itself at the intersection of three aspects of ethics in design research: governance, context-dependent issues, and design ethics. It considers them intertwined, as they influence how the research is designed and conducted. I argue the production of PI materials for obtaining informed consent can be described as a design process that can take advantage from design practices to negotiate between academic and legal requirements, be consistent with local cultural values and norms, and initiate and nurture relationships and conversations between researchers and participants.

3. About the research and the researcher

My PhD investigates how sustainability cultures can emerge through social craft. It focuses on craft communities in Devon and, more generally, Southwest England. Before moving to the area in 2020 I had no prior knowledge of local craft ecologies, so the need to establish reciprocal and mutual relationships is both personal and professional: as a visual designer and illustrator, I can be perceived as a new member of the local creative community; and as my home institution is in London, I can be considered an external doctoral researcher who is there to observe and gather information. Therefore, my approach tries to find a balance between these two identities to avoid jeopardising newly established relationships.

3.1. Initial exploration

Preliminary exploration showed local craft ecologies' configuration varies and adapts depending on whether they organise within an institution, a place, or an event. Members come from different socio-cultural backgrounds and from various parts of Southwest England. The variety of demographics and the continual reconfiguration of these communities creates shifting hierarchies and social organisations, where roles between members are rearranged over time. The mixture of experience and professionalism contributes to a plurality of meanings assigned to 'craft' and 'sustainability' which are continually renegotiated.

3.2. On the methodology

The study uses a graphic ethnography (Theodossopoulos, 2022) where observational sketching (Heath et al., 2018) serves both as notetaking for data collection and as a mediating object in spontaneous dialogues and oral history interviews (figure 1). Since drawing is a cultural practice (Geismar, 2014) akin to craft, its use as a research tool resonates with craftspeople, allowing for trust building between researchers and participants through a common 'craft' language.
When working with children, graphic ethnography is expected to help establishing trust as drawing is perceived as a 'childish activity' which casts the adult researcher as a 'different adult' (Spray, 2021). The correspondence between the researcher's creative action of drawing and the participants' creative action of making characterises this study as participatory research carried out "about" and "with" participants (Shier, 2021), which demands flexibility in addressing anonymity and recognition.
Additionally, the creation of an online collection of drawings and interviews resonates with craft and art people, who value exposing their works in galleries and collections.

Figure 1. Conducting graphic ethnography: sketching at the 'Corn Flax Doll' workshop at MAKE Southwest, March 2024.

4. Designing the participant information experience

4.1. On *Informed Consent*

Informed consent (IC) is a codified practice (Cocanour, 2017) establishing that "information can be collected from or about people only if they have understood the purpose of the research and what their participation entails, and have freely agreed to participate in it" (Social Research Association, 2021). *Consent* is better understood as a negotiation process throughout the research (Social Research Association, 2021) and as a conversation (Cocanour, 2017) that is influenced, among other factors, by the type of relationships established between researchers and participants. IC is generally reached through PI sheets, which are comprehensive documents that outline the research goals and methodology, risks and tasks involved, and the conditions for participation.
Universities often offer a text-based template prefilled with the required legal information about data, privacy and details of the university office overseeing this process. In the case of my research, however, the shifting hierarchies, the plurality of demographics, and the ever-changing configuration of the local communities, paired with the necessity to use the recruiting phase for relationship building and strengthening, required an ad-hoc, integrated, flexible, and responsive approach.

4.2. To inform as 'giving a shape' to the research

Drawing on the original meaning of the Latin word *informare*, "to give a shape", I applied my expertise as a visual designer to create engaging PI materials where the act of *getting informed* is conceived as an experience.
The creation of a website that 'gives a defined and recognisable shape' to the project takes advantages of the ubiquity of digital information technologies and represents a virtual space for people to access the information they need about the research.
The PI sheets have been designed to incorporate and represent, through the combination of visual and textual elements, three key aspects of the project (figure 2):

- The methodology, i.e. graphic ethnography, with drawings included in all versions of the documents;
- The research object, i.e. craft, reflected in the binding of the hard print or in the making of the responsive webpages;
- The research ethos, i.e. sustainability and accessibility, which focus on having both physical and digital versions of the materials, offering people different channels to access information, while minimising waste.

Figure 2. Printed versions of the PI sheets for children being stitched together in a booklet

4.3. The design of participant information sheets

I divided participants into two macro groups, adults and children, which served as guidance for structuring documents using age-appropriate language and storytelling (figure 3). All PI sheets are structured as interviews, where the reader is the interviewer and the researcher the interviewee, mirroring interview dynamics taking place in the study, though with inverted roles. Mimicking popular visual language in newspapers and magazines, paragraph headings are direct questions typed in bold while answers are the body text of the paragraph. The printed copies of the documents have been bound using saddle stitching, giving the documents a 'crafted' aesthetic.

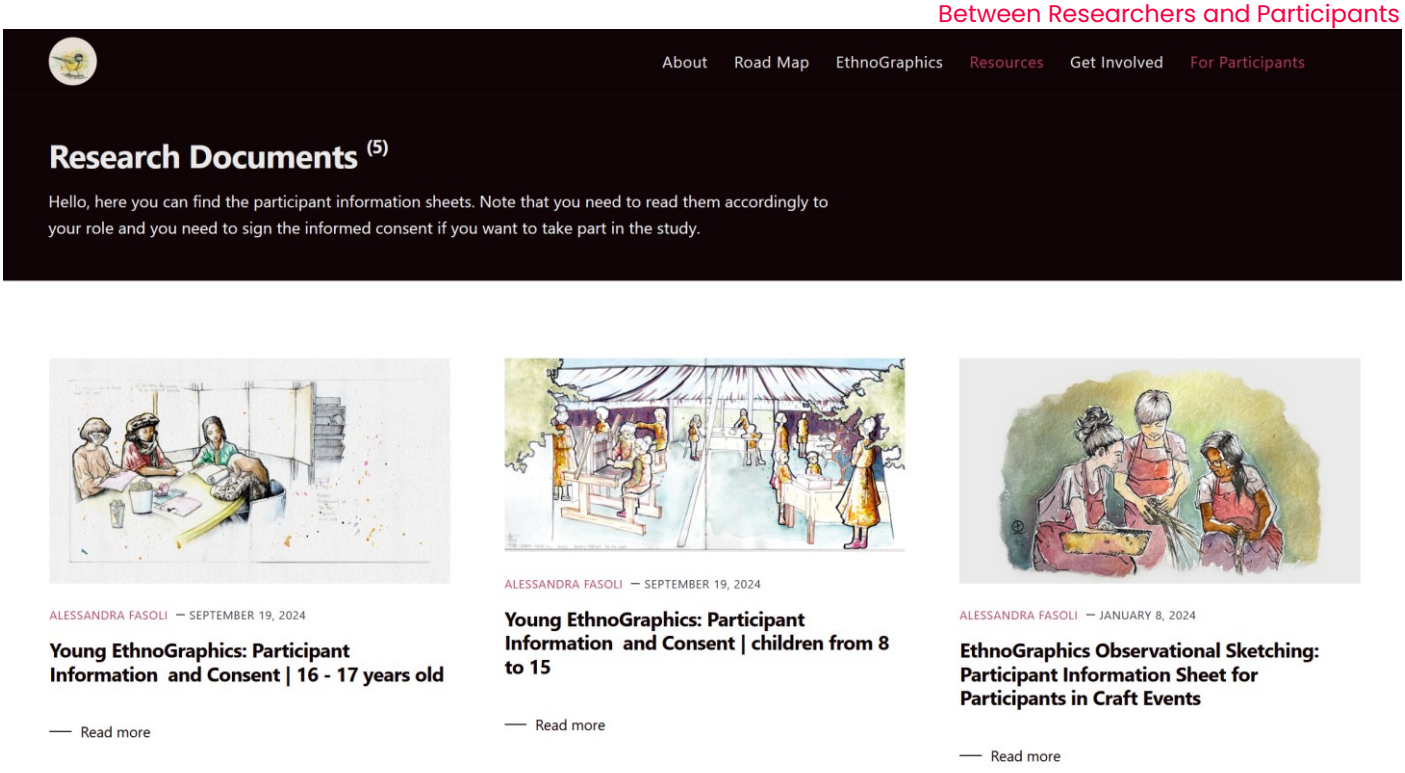

Figure 3. A screenshot of the research website page containing the different online versions of the participant information sheets divided by age and category.

Adults are divided into three categories: makers for long interviews, event and workshop facilitators that I join during their social activities and briefly interview, and the attendees of craft events. PI sheets have been adapted to each group selecting the necessary information while considering the hierarchies inherent to the specific context where the study takes place. Each PI sheet has a corresponding webpage within the project's website to be accessed from different devices.
Attendees to craft events are generally approached on the day of the event, where I am introduced by the facilitator. I inform attendees at the beginning of the session and use printed versions of the PI sheets to visually support my explanation (figure 4). In this case, consent is negotiated before and during the event.

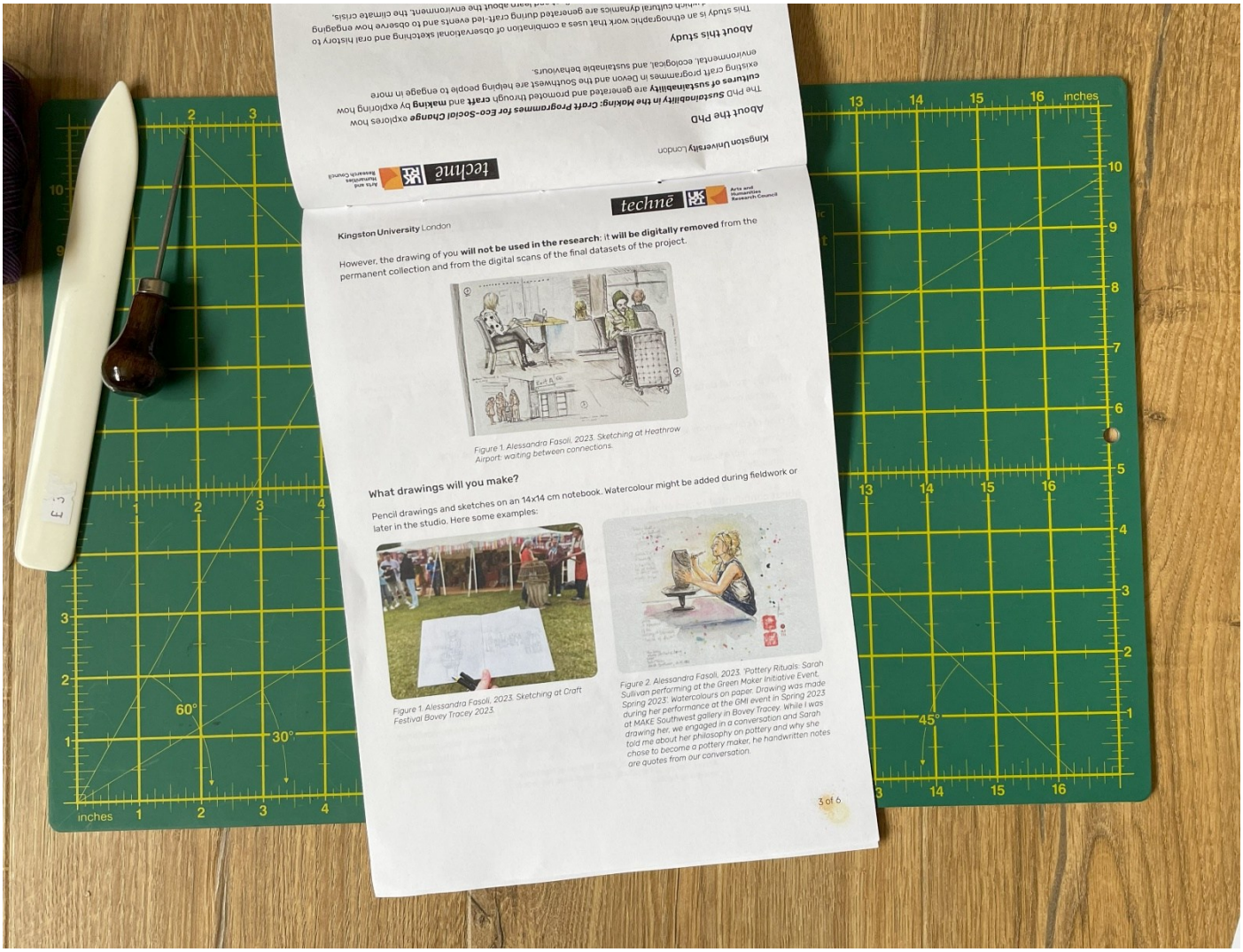

Figure 4. Visual participant information sheets for adults.

Children are divided into three age groups (National Society for the Prevention of Cruelty to Children, 2023) to create age-appropriate accessible and readable PI documents, framed as a dialogue in the form of comics. Children's PI sheets have been designed as illustrated booklets (print), presentations (pdfs), and web comics (responsive webpages), and the use of graphic storytelling mirrors the research methodology. Language is simplified and concepts like 'sustainability' and 'craft' have been replaced by simpler words like 'nature' and 'making things'. While parental consent is required for children between 5 and 15 years old, these documents are designed primarily for children to exert their agency and decide themselves whether to participate in the study. The web comic (figure 5) is designed to be read together by parents/guardians and children and is useful when event organisers can contact parents/guardians in advance via email, giving them time to reflect and discuss with their children about taking part.

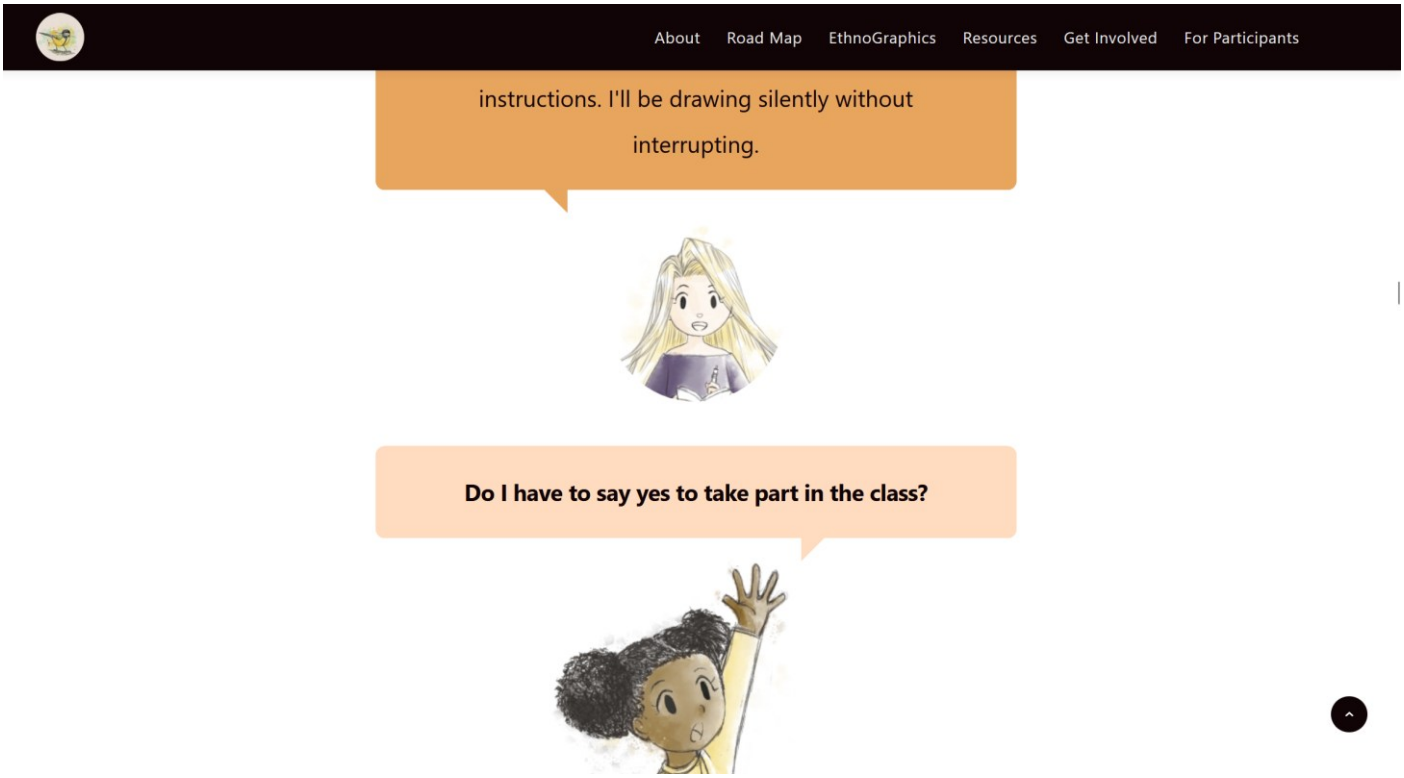

Figure 5. A screenshot of the online participant information sheet for children designed as a web comic.

5. Observations and discussion

5.1. Reciprocity and Mutuality

The project is still ongoing: field work with adults has started in February 2024, while the work with children has started in the beginning of 2025.
The first year of field work with adults has shown a generally positive response, due to the existing local interest in sustainability and a cultural appreciation of artistic projects. Trust between me and participants is built and maintained over time through constant conversations facilitated by the research website that I regularly update with field drawings, small writings, and news. Trust between me and the attendees is mediated by facilitators or organisers, and though attendees have the option to contact me further, none have done so thus far. A small number of craftspeople that I have sketched during public events have written to me afterwards making them available for long interviews. Digital scans of the drawings are sent to participants, who in some cases have shared them on their social media profiles. In one case, a craftsperson used it to promote their own activities and work, demonstrating illustrations also have material value for advertising and promotion .
The printed version of children's PI sheet is designed as a colouring book. Trust between me, them, and their parents/guardians is mediated by the facilitator or teacher, although on some occasions, I run 'icebreaking activities' in the form of observational drawing workshops. These workshops are not meant for data collection but designed to introduce young people to observational drawing and journaling.

5.2. Issues and considerations

Despite the effort to produce engaging materials and build reciprocal relationships, some people still refused to participate, so consent is not guaranteed. Considering the time and effort required for designing ad-hoc information experiences, benefits and drawbacks should be carefully evaluated. Moreover, university ethical protocols might not allow for a creative approach in producing research materials.
The absence of pre-existing skills for engaging in such approaches could also be a barrier for researcher to pursue such approach.
Finally, illustration approaches need to carefully consider issues of representation and local visual cultures, to avoid designing biased and/or misleading information experiences.

6. Conclusions

Approaching the issue of IC from a design perspective allowed me to frame the act of 'getting informed' as an experience through which I am building reciprocal and mutual relationships and navigating my dual role as a new member of the local creative community and as an external researcher. It also allowed for creative engagement and relationship building when seeking consent, without dismissing the ethical obligations researchers have towards participants.
This paper opens a conversation about unconventional and creative approaches to ethics procedures, arguing they can become a tool for building reciprocity and mutuality in community-based projects.

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INNOVATION IN INTEGRATD PUBLIC SERVICES: A PILOT PROJECT WITH GSI S.r.l. USING SYSTEMIC DESIGN, BLOCKCHAIN AND AI.

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ABSTRACT | Addressing the challenges in integrated public services requires innovation that promotes sustainability, efficiency, and transparency. This pilot project, in collaboration with GSI S.r.l., explores how the integration of systemic design, blockchain technology, and artificial intelligence (AI) can revolutionize facility management, setting new standards for ethical and responsible governance.
GSI S.r.l., active in sectors such as sanitation, social healthcare, and catering, manages complex services that demand sophisticated coordination. The systemic design approach at GSI leverages advanced AI models, such as Large Language Models (LLMs), to dynamically and adaptively map and analyze interactions across services. AI automatically identifies inefficiencies and suggests solutions to optimize user experience, increase operational sustainability, and reduce costs.
Simultaneously, blockchain ensures data integrity and traceability. Within the project, blockchain technology validates sanitation certifications, tracks personnel credentials, and secures sensitive information related to healthcare services. This technology guarantees data remains secure and immutable, strengthening stakeholder trust. Furthermore, AI employs General Linear Models (GLM) to analyze large datasets, offering detailed insights and supporting evidence-based decision-making. The synergistic integration of systemic design, blockchain, and AI not only enhances efficiency and transparency but also creates a new governance paradigm rooted in care. This approach allows for the customization of services to meet user needs and promotes proactive resource management, ultimately improving overall service quality. The pilot project with GSI S.r.l. serves as a replicable example for other public organizations, demonstrating that adopting advanced technologies and holistic design strategies can transform public action into a more ethical, efficient, and community-focused direction.

KEYWORDS | Systemic Design, Blockchain, Artificial Intelligence, Public Integrated Services, Sustainability

1. Introduction: Why Rethinking Public Services Matters Today

In the contemporary context, public services and the organizations operating within them are at the forefront of a new revolution, one that sees technology working in parallel with human labor. On the one hand, citizens' expectations are rising: they demand more efficient, personalized, transparent, and responsive services capable of addressing continuously evolving needs (Schmidt & Rüther, 2018). On the other hand, public administrations face structural constraints, limited resources, organizational complexity, and environmental challenges that render traditional management models obsolete. In addition, demographic ageing and emerging social vulnerabilities necessitate a radical rethinking of how services are delivered (Osterwalder & Pigneur, 2010). Within this scenario, innovation can no longer be understood as mere technological upgrading or incremental efficiency. What is needed is a paradigm shift, one that places at its core the complexity of systems, interconnection among stakeholders, public ethics, and long-term sustainability. This is the foundational premise of the pilot project developed in collaboration with the facility management company Gestione Servizi Integrati S.r.l. (GSI), based in the province of Turin but operating across Italy in key sectors such as facility management, social and healthcare services, and collective catering (GSI, 2025). Over the course of three years, the project aims to experimentally explore how systemic design, artificial intelligence (AI), and blockchain technologies can be integrated to radically transform the ways services are planned, managed, and experienced. The objective is not merely to improve performance and processes, but to rebuild trust, ensure transparency, and foster a more ethical, responsive, and human-centered approach to public management. GSI S.r.l. provides an ideal experimental ground: it manages highly complex, interconnected services requiring constant coordination between operators, public entities, regulatory standards, and citizen expectations across various public procurement contexts throughout Italy. In this framework, the adoption of intelligent and traceable tools allows for proactive management of issues that would otherwise remain invisible or poorly handled. This initiative aspires to become a replicable model for reimagining public action as a living, adaptive system based on care. The present article reconstructs its rationale, employed technologies, and ethical implications, illustrating how the synergy between technological innovation and systemic thinking can represent a turning point in envisioning the public services of the future.

2. Systemic Integration: Design, AI, and Blockchain as an Ecosystem

Addressing the complexity of public services requires an approach capable of discerning the connections among diverse elements: people, processes, data, regulations, and needs, while simultaneously designing systems that are both flexible and sustainable. It is in this sense that systemic design serves as the methodological cornerstone of the project (Bistagnino, 2009). Systemic design is not merely a design technique but a structural vision that enables the mapping of relationships among services, stakeholders, and resources (Jones, 2014). Within this framework, digital technologies do not operate in silos but are integrated as components of a unified system (Sevaldson, 2013). AI, blockchain, and organizational processes are interconnected through a continuous codesign logic, in which each component functions in service of the equilibrium of the overall system (Jones & Van Ael, 2022).

This integration is not only technical but also cultural and organizational: it requires a

redefinition of roles, responsibilities, and interactions between personnel and technology. The focus shifts from merely managing operational issues within public tenders to designing sustainable relationships among all involved actors. Within this framework, innovation becomes truly transformative, capable of generating long-term public value.

2.1 AI Applied to Public and Facility Services

In the GSI S.r.l. project, AI is not conceived as a mere tool for automation, but as an adaptive engine capable of supporting complex decision-making in dynamic operational environments (Susskind, 2020). By leveraging advanced models such as Large Language Models (LLMs) and General Linear Models (GLMs), AI can analyze vast and heterogeneous datasets, detect hidden patterns, propose customized solutions, and generate reliable forecasts (Brown et al., 2020). In practical terms, LLMs can learn organizational activities and dynamics from limited data, enabling real-time optimization of staff scheduling based on workload and specific operator needs. AI also facilitates rapid assessments of food supply volumes and waste levels at cooking points, thereby improving waste reduction strategies. Thus, AI becomes an invisible ally, enhancing service quality without overburdening human staff.

However, implementing AI in public services raises significant ethical concerns. It is essential to ensure that automated decisions are fair, transparent, and explainable, and that algorithms do not replicate or exacerbate existing inequalities (Floridi et al., 2018; Mittelstadt et al., 2016). These considerations are not sidestepped but are integral to the project's systemic design. All models are transparently validated, with documented sources, logic, and limitations (Burrell, 2016). The principle of algorithmic accountability is applied, ensuring AI decisions can be explained and contested (Diakopoulos, 2016). Moreover, AI is designed to collaborate with, not replace, human operators, preserving human agency in final decision, making processes (Wang et al., 2021). This promotes a form of augmented intelligence, where technology amplifies human care, attention, and responsibility (Shneiderman, 2020).

2.2 Blockchain and Public Trust: Traceability, Integrity, and Privacy

Originating in the world of cryptocurrencies, blockchain technology is emerging as a critical tool for ensuring integrity, traceability, and decentralization in public service contexts (Zhang & Huang, 2020). Its potential extends far beyond digital currencies: in complex systems such as those managed by GSI S.r.l., blockchain enables the transparent and tamper-resistant certification of actions and data through notarization (Gipp, Meuschke, & Gernandt, 2015). In the pilot project, blockchain is used to notarize operational certifications. For example, sanitation activities in healthcare or educational settings can be verifiably recorded and made accessible only to authorized individuals (De Meijer, 2018). Similarly, training certificates, health authorizations, and professional accreditations can be securely archived and shared in digital form, reducing processing time and manipulation risks, resulting in a "digest" or verification certificate. In the social and healthcare domains, blockchain safeguards the confidentiality of sensitive data while ensuring secure, compliant traceability (Esposito et al., 2018). Nevertheless, blockchain implementation in public contexts raises ethical and environmental concerns. The permanence of recorded data and access management require careful oversight by both the company and public contractors (de Filippi & Wright, 2018).

Ethically, blockchain is employed to ensure process transparency and trust, avoiding centralization and opacity (Tapscott & Tapscott, 2016). The system adopts a permissioned architecture that ensures regulated and documented access while protecting sensitive information. Interfaces are designed for clarity and accessibility, and data management adheres to the principle of minimization: only essential data is stored, in full

compliance with the General Data Protection Regulation (GDPR) (European Union, 2016; Finck, 2018). From an environmental standpoint, the project utilizes low-energy blockchain technologies, avoiding high-consumption models like proof-of-work, known for their substantial ecological footprint (Truby, 2018). The chosen infrastructure is lightweight and scalable, aligned with principles of energy efficiency and technological sustainability (Sedlmeir et al., 2020). In this light, blockchain is not merely a technical instrument but part of a broader design ecosystem that integrates social justice, environmental sustainability, and institutional accountability.

3. Transversality and Replicability of the Model

The pilot project implemented with GSI S.r.l. represents not only a virtuous case of technological innovation in public services, but above all a transformative model that integrates efficiency, ethics, and sustainability. At the heart of this model lies a concept often absent in discussions of technological innovation: the ethics of care. To care, in the public domain, means to recognize human vulnerability and the complexity of needs, and to design services that are empathetic, responsive, and personalized. This does not entail rejecting technology but rather using it to enhance relational capacities rather than replace them. A concrete example is the adaptation of social and healthcare services based on feedback from users and staff. Data, analyzed through interpretive as well as statistical methods, make it possible to listen to the most marginalized voices, often excluded from traditional decision-making processes. In this context, AI does not act as a filter but as an amplifier of listening. Similarly, blockchain's traceability returns power and transparency to those historically deprived of it. This "governance of care" values the human and relational dimensions of public service and demonstrates how technology can be designed to strengthen trust, inclusion, and accountability. The goal is not simply to do better, but to do differently: to build services that learn, adapt, and care (Bason, 2014).

4. Conclusions and Future Developments

Although still in progress, the research yields promising signs: greater process transparency, reduced operational inefficiencies, improved perceived service quality, and increased accountability among operators and institutions. More importantly, it signals the emergence of a new cultural paradigm in which innovation is measured not only by performance, but by the value it generates for the community.
Can this approach be replicated? While the answer is still under investigation, it is essential to understand from the outset that this is not a "technological package to be installed," but a continuous process of learning and co-design. Every context has its own specificity, yet core principles, transparency, adaptability, and ethics of care, can guide any public or private organization in its evolution. Challenges remain: from system interoperability to workforce training, from data protection to fostering a culture of people-centered innovation. Nevertheless, the experience gained thus far at GSI shows that it is possible to activate collaborative ecosystems in which institutions, companies, citizens, and technologies work together to build more just, intelligent, and resilient public services (Mazzucato, 2018). Looking ahead, we can envision a regenerative public administration, one that not only delivers services but nurtures territories, relationships, and trust. A public sector that not only reacts to emergencies but anticipates, listens, and adapts. In this future, technology is not an end in itself but a means of empowerment, equity, and democratic regeneration. True innovation today is that which unites efficiency with meaning, impact with dignity, and design with the common good. The GSI pilot project offers one possible path, yet it is up to us to choose whether to follow it.

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LEVERAGING DESIGN STRATEGIES TO ENHANCE AGRIFOOD SYSTEMS IN THE GLOBAL SOUTH

Daniela Passa

ABSTRACT | This paper explores the transformative potential of digital technologies and transdisciplinary design strategies to improve feedback mechanisms between smallholder farmers and institutional actors in the Global South. Despite growing interest in digital tools, adoption remains limited due to persistent challenges such as inadequate infrastructure, limited digital literacy, and trust deficits. Drawing on participatory agricultural initiatives and digital innovation pilots across multiple countries, this research identifies recurring barriers to digital adoption and emphasizes the importance of aligning technological solutions with local communication practices and user capabilities.
The study demonstrates how participatory design can foster trust and usability through co-creation with farmers, while systemic thinking reveals leverage points for scalable, long-term impact. Key recommendations include investment in rural infrastructure, tailored digital literacy efforts, inclusive co-design approaches, and policy frameworks that support transparent, two-way feedback systems. By integrating local knowledge into the development of digital tools and fostering collaboration across sectors, these strategies can help strengthen agrifood systems, empower smallholder farmers, and contribute to more inclusive and resilient approaches to food security.

KEYWORDS | PARTICIPATORY DESIGN, SYSTEMIC THINKING, AGRIFOOD SYSTEMS, DIGITAL INCLUSION, SMALLHOLDER FARMERS

1. Introduction

Sustainable food security remains a critical challenge in the Global South, where smallholder farmers produce approximately 80% of the region's food supply (Massari, 2021). Despite their pivotal role, these farmers face significant barriers to adopting digital tools that could improve productivity and resilience. Structural obstacles, including inadequate infrastructure, limited digital literacy, and mistrust, hinder access to technological innovations. At the same time, agribusinesses and other stakeholders struggle to collect timely, accurate feedback due to fragmented communication systems and poor interoperability (Burke & Sewake, 2008; McKinsey & Company, 2023).

An agrifood system, as defined by FAO & CIRAD (2024), encompasses a wide range of actors, including farmers and farmer organizations, public and private extension services, policy and decision-makers, research and academia, civil society, and the private sector, whose interactions shape how food is produced, distributed, and consumed within specific environmental, economic, and social contexts. This paper focuses on the interaction between farmers and three key groups: extension and advisory services, research and academia, and policy-makers. These relationships are central to understanding the potential, and current limitations, of participatory and systemic design strategies for improving digital feedback mechanisms in agrifood systems.

This study focuses on the primary production level, applying a Design Thinking lens to explore the experiences of smallholder farmers as end users of digital tools. At the same time, it adopts a systemic perspective to examine enabling conditions shaped by upstream actors and identify where broader ecosystem-level changes are needed.

Mobile-based digital platforms offer strong potential to bridge communication gaps through real-time data exchange. However, their effectiveness depends not only on technical functionality but also on social acceptability and user capability (Deichmann, Goyal, & Mishra, 2016). Misaligned, top-down interventions, often developed without sufficient local input, have historically undermined trust and engagement.
To address these barriers, this paper explores how participatory design and systemic thinking can jointly enhance feedback loops and foster inclusive innovation. Participatory design promotes trust, ownership, and contextual relevance by involving farmers in shaping solutions (Smith & Iversen, 2018), while systemic thinking identifies upstream leverage points for long-term, sustainable change.

Drawing on secondary case studies, including a digital readiness assessment from Syria, Farmer Field Schools in Togo and Burkina Faso, and the GeoFarmer pilot, the study identifies recurring enablers and constraints to digital adoption. It concludes with actionable design and policy recommendations to strengthen feedback mechanisms between farmers and institutions in the Global South.

2. Participatory Approaches in Agrifood Systems

As agrifood systems are composed of intricate networks of farmers, agribusinesses, consumers, and policymakers, effective collaboration among these stakeholders is essential to achieving food security and sustainability (FAO & CIRAD 2024). Yet in the Global South, systemic barriers such as limited technological infrastructure, underdeveloped markets, and weak institutional support often hinder such collaboration (Deichmann, Goyal, & Mishra, 2016).

In response, participatory approaches have emerged as a compelling alternative to conventional top-down strategies. These methods directly involve farmers in the design, implementation, and evaluation of interventions, fostering trust, local ownership, and alignment with community needs (Massari, 2021). When local knowledge is integrated through participatory design, solutions are typically more relevant to context and more likely to be adopted and sustained over time (Smith & Iversen, 2018).

This perspective is reinforced by Duncombe, who argues that mobile agricultural services are most effective when farmers are actively involved in shaping the tools and information systems they use, emphasizing their role as learning communities rather than passive recipients (Duncombe, 2016). To illustrate this, participatory workshops in West Africa facilitated co-design efforts between farmers and mobile service providers, resulting in platforms that were better aligned with local realities and more widely adopted (Duncombe, 2016). As farmers become familiar with digital systems through hands-on involvement, they may gain the confidence and capacity to sustain and adapt these tools independently. This, in turn, can strengthen innovation and collaboration at the community level.

However, despite these advantages, participatory strategies face significant challenges, particularly in establishing effective feedback mechanisms between farmers and institutional actors. One illustrative example is the experience of Farmer Field Schools (FFS), a group-based learning approach developed by the FAO to support smallholder experimentation and peer-to-peer knowledge exchange. In Togo and

Burkina Faso, FFS enabled farmers to adopt agroecological practices such as composting, integrated pest management, and soil conservation through co-designed, experiential learning processes. Yet these innovations largely remained confined to the farm level and did not translate into broader structural shifts within institutional or market systems. As Bakker et al. (2021) emphasize, while participatory approaches like FFS can be powerful tools for agroecological transition, supporting farmer autonomy, adaptation, and innovation, their effectiveness depends on genuine power-sharing, skilled facilitation, and institutional environments that are receptive to farmer-led change. When participation is superficial or poorly implemented, such approaches risk losing their transformative potential.

Addressing these limitations requires more than technical solutions. Sustainable collaboration demands long-term investment in training, infrastructure, and institutional capacity. As evidenced by these cases, even well-intentioned participatory initiatives risk remaining fragmented or symbolic without the necessary support structures. However, when adequately resourced and embedded within inclusive governance frameworks, participatory approaches offer a promising pathway to align technological innovation with local knowledge, especially when anchored by sustained, two-way feedback mechanisms.

3. Challenges in Feedback Mechanisms

While digital platforms have improved data collection and communication between farmers and agribusinesses, several persistent challenges continue to limit their scalability and effectiveness. These barriers can be grouped into three main areas: technological infrastructure, digital literacy, and trust.

3.1. Technological Infrastructure

Many rural areas in the Global South suffer from unreliable internet connectivity and limited access to digital devices, restricting farmers' ability to engage with digital platforms (Deichmann, Goyal, & Mishra, 2016). Without sustained investment in communication infrastructure and device availability, these regions risk exclusion from emerging technological ecosystems. Infrastructure development programs must prioritize expanding mobile coverage and ensuring the affordability and availability of tools adapted to local conditions.

3.2. Digital Literacy

Even where technology is physically available, limited digital literacy constrains its meaningful use. Many farmers report difficulty with tasks such as navigating mobile applications, entering data, or interpreting visual outputs (Salemink, Strijker, & Bosworth, 2017). Tailored training and long-term capacity-building programs are necessary to bridge this gap and ensure inclusive digital participation.

3.3. Trust Deficits

Historical mistrust of development initiatives remains a significant barrier to technology adoption. Concerns over data privacy, surveillance, and lack of transparency persist, particularly in contexts where previous projects lacked follow-up or failed to meet expectations (Burke & Sewake, 2008). Building trust requires ongoing dialogue, responsiveness, and policies that protect users while demonstrating value in the technology provided.

These three categories of challenges, technological infrastructure, digital literacy, and trust, are strongly reflected in recent field data. A Syria Digital Readiness Assessment conducted with 230 FFS facilitators revealed that while a majority were confident using WhatsApp, fewer than 20 percent felt comfortable using Excel, or PowerPoint, particularly in governorates such as Deir-ez-Zor and Aleppo. Facilitators also reported unstable internet connections during training sessions, which disrupted data sharing and limited real-time communication. In addition, many noted that while they regularly submitted reports via WhatsApp, they rarely received any response, leading to frustration and a perceived lack of institutional follow-up. This absence of two-way engagement signals not only weak feedback mechanisms but also contributes to declining trust in digital processes and project continuity (Syria Digital Readiness Assessment, FAO, unpublished data, 2025).

Additional evidence highlights both the promise and the limitations of digital feedback tools in low-connectivity environments. For example, the GeoFarmer system, developed by CGIAR and partners, enabled near real-time communication between farmers and experts through mobile apps and IVR systems in several countries. However, despite its modular architecture and participatory design approach, the platform faced ongoing challenges related to usability, digital literacy, and trust-building (Eitzinger et al., 2019). In a related study focused on Tanzania, IVR-based feedback systems saw participation rates drop below 40%, while in-person facilitation yielded response rates as high as 89, underscoring the importance of context-specific engagement methods and sustained capacity-building (Ortiz-Crespo et al., 2021).

4. Systemic and Design Thinking in Agrifood Systems

Addressing these challenges requires coordinated efforts to strengthen infrastructure, enhance digital skills, and foster trust. When combined with participatory engagement, digital inclusion strategies can help establish more effective and sustainable feedback mechanisms between farmers and institutions.

In addition to participatory and design approaches, a systemic perspective is essential for understanding and addressing the broader structural dynamics that shape agrifood systems. Systemic and design thinking offer complementary frameworks for navigating the complexity of digital transformation in the Global South. Both prioritize collaboration, contextual sensitivity, and iterative learning, making them particularly suitable for addressing interconnected technical and socio-cultural barriers.

Systemic thinking focuses on mapping interdependencies within complex systems to identify key intervention points. In agrifood systems, this involves considering environmental variability, market dynamics, policy constraints, and social relationships to design holistic, multi-layered solutions (Massari, 2021).

Design thinking, by contrast, emphasizes empathy, co-creation, and iterative problem-solving. Engaging farmers directly in identifying challenges and testing solutions ensures that innovations are user-centered and context-appropriate (Smith & Iversen, 2018). This methodology enables continuous feedback and solution refinement, increasing the likelihood of adoption and sustained use.

Digital interventions that include farmers in early testing phases, and therefore adopt a more co-creative approach, are more likely to be adapted, trusted, and sustained (Duncombe, 2016). However, scaling these approaches requires long-term investment not only in infrastructure but also in institutional readiness and cross-sector collaboration (McKinsey & Company, 2023). An integrated approach that combines both systemic thinking and design thinking, supported by public-private partnerships and regional knowledge hubs, can help ensure that these strategies are not isolated experiments but embedded tools for inclusive transformation (FAO & CIRAD, 2024).

5. Conclusion

Participatory design and digital technologies offer significant potential to enhance feedback mechanisms in agrifood systems across the Global South. Yet this potential is often undermined by persistent structural barriers such as limited digital literacy, inadequate infrastructure, and trust deficits. To be effective, digital interventions must balance technical functionality with social acceptability and user capability.

Case study evidence reinforces this point. For example, Farmer Field Schools in West Africa show that while participatory approaches can successfully drive farm-level innovation, they often fail to scale without institutional engagement. Similarly, a digital readiness assessment in Syria found that only 20% of facilitators felt confident using structured digital tools, despite widespread use of WhatsApp, highlighting the importance of aligning solutions with existing communication habits and infrastructure realities.

This research confirms that participatory design and systemic thinking offer complementary frameworks for addressing these challenges: the former fosters trust and contextual relevance through co-creation, while the latter helps identify leverage points for long-term, structural change. Field observations consistently demonstrate that tools aligned with farmers' everyday practices achieve higher uptake than those requiring significant training or behavioral shifts.

Investments in rural digital infrastructure, targeted capacity-building, and inclusive policy frameworks remain essential foundations for success. Future research should focus on how participatory and systemic approaches can be integrated and scaled, through regional collaboration, public–private partnerships, and innovative financing models. Interdisciplinary studies are also needed to explore how these strategies interact in diverse agricultural contexts.

By adopting these strategies and centering local voices in the design of digital tools, stakeholders can empower smallholder farmers, strengthen feedback loops, and contribute to more inclusive, resilient, and just agrifood systems across the Global South.

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Multidimensional health-oriented development used to formulate design guidelines for improving the child-friendliness of urban community play facilities in China

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ABSTRACT | In global urban planning, the construction of child-friendly cities has become a key issue, especially in the context of rapid urbanization in China. Community play facilities have become a vital avenue for promoting the holistic health and overall well-being of children. The systematic coordination of facilities addressing diverse health needs, including physical activity, psychological development, and social interaction, has become increasingly important. Professor Engel's "Physiological-Psychological-Social" multidimensional health theory model, as a systematic approach, offers a scientifically grounded and specific focus on the multidimensional health needs of children. This model provides a new perspective for promoting child-friendly and health-oriented urban community public play facilities. This study applies grounded theory, the Delphi method, and the Analytic Hierarchy Process (AHP) to propose a framework of design guidelines for multidimensional health-oriented community play facilities and demonstrates how this framework can be used to improve the child-friendliness of play facilities in Chinese communities. The empirical research was conducted in Wuxi, a designated child-friendly city in China, to identify key issues requiring design intervention and propose improvement strategies. The results will provide theoretical support and practical guidance for urban facility designers, urban planners, and policymakers in China, offering a replicable framework for building more comprehensive, healthy, inclusive, and sustainable urban environments.

KEYWORDS | Community play facilities design, Urban sustainability, Multidimensional health, Design guidelines, Child-friendly design

1. Introduction

The UNICEF Innocenti Research Centre defines "play and leisure" as well as "health and social services" as key dimensions for assessing child-friendly communities (UNICEF, 2011). As one of the key expressions of child-friendliness in urban communities, play facilities have become a primary focus in urban planning. In recent years, with increasing attention to child-friendliness and inclusivity, many studies have explored how facility design can promote children's health and well-being. In this process, children are often considered as a vulnerable group requiring special protection, and research has typically concentrated on physical safety, accessibility (Shackell et al., 2008; CCYP, 2011), and other physical safeguarding elements. However, in the face of rapid urbanization, the problems arising from a singular development focus have become evident, failing to promote comprehensive growth in children's physical, perceptual, cognitive, emotional, and social development.

Although research has gradually focused on improving children's motor skills (Giraldi et al., 2017), social skills (Afsharlahoori, 2007), place-based interactive learning (Ramezaani & Said, 2013), and children's participation in decision-making processes (Haider, 2007; Freeman, 2011; Agarwal, 2021), these studies have not systematically and comprehensively considered the synergistic development of children across multiple health dimensions. Therefore, this study introduces the multidimensional health theory model, which was first proposed by Professor George Engel in 1977. It is one of the most influential theories in the human health field. In recent years, the model has been widely applied in urban spaces (Santi, 2019), architectural environments (Angelucci, 2024), and other design fields, providing theoretical support for human-centered health, well-being, and sustainable development. This model integrates health impact factors into three interrelated systems: physiological, psychological, and social health. It promotes health through process interventions, focusing on problem-solving (Card, 2023). The introduction of this model conceptualizes health conditions and their determinants as a multi-layered nested system, effectively integrating development goals, play content, and interaction modes in facility design to achieve more systematic solutions that align with children's health and well-being.

2.Methodology

Based on the multidimensional health theory framework, this study identifies three key dimensions for the community play facility design guidelines: physiological health, psychological health, and social health. First, qualitative research methods such as literature review, case studies, and field surveys were used to extract relevant textual elements under each dimension. Grounded theory was then applied, using NVivo software for coding to preliminarily form the design guidelines framework. Subsequently, the Delphi method and Analytic Hierarchy Process (AHP) were used for model calibration and weight analysis of the multidimensional health-oriented child-friendly community play facility design guidelines framework. Finally, the study conducted an empirical investigation in Wuxi, China, evaluating representative community play facility design practices and analyzing influencing factors to propose targeted improvement strategies.

Regarding data collection, the study employed both desktop research and field surveys to gather original data. First, through literature research, 110 valid articles related to multidimensional health needs and child-friendly facility design elements were identified from Web of Science and China National Knowledge Infrastructure (CNKI). Then, case studies were conducted, selecting four influential international child-friendly community play facility examples, considering their representativeness, historical development, and constructive impact on the times. Third, non-interventional user behavior observation was conducted in 16 typical community cases in Wuxi (including neighborhoods, squares, streets, parks, etc.), objectively collecting issues and focal points from users of community play facilities. Through a bottom-up approach, the study synthesized elements from literature, case studies, and field surveys, coding and analyzing 2/3 of the sample and using the remaining 1/3 for theoretical saturation testing of the final conceptual framework, thus forming a preliminary design guidelines framework.

To enhance the scientific and rational nature of the indicator system, the Delphi method and AHP were used to construct the indicator system and calculate its weights. These methods are widely used for determining evaluation factors, assigning weights, and scoring. Through multiple rounds of anonymous expert feedback and structured hierarchical processing, the methods effectively addressed complex issues, ensuring broad applicability, professional rigor, and practical relevance. A total of 25 experts from five related fields participated in the scoring and judgment matrix construction, including child-friendly urban design and planning, environmental facility product design, child development and education, public health and health, and environmental psychology. This systematic approach facilitated the formation of the multidimensional health-oriented child-friendly community play facility design guidelines framework, encompassing the definition, standards, and value explanation of each indicator.

3.Results

3.1 Guidelines

This study proposes a multidimensional health-oriented child-friendly community play facility design guidelines framework, consisting of three primary indicators and nine secondary indicators. The final indicator system and its detailed explanations are presented in Table 1. Each indicator is assigned a specific weight to guide designers and planners in prioritizing the most critical design elements in practice (Figure 1).

Table 1. Multidimensional Health-Oriented Child-Friendly Community Play Facility Design Guidelines Framework

Target Layer	Dimension Layer	Guideline Layer	Description of Guideline
Multidimensional Health-Oriented Child-Friendly Community Play Facility Design	P1 Biological Health Support	PH1 Space Accessibility and Safety (Weight: 0.441)	The facility should have good visibility, convenient path accessibility, and basic environmental safety to support children's free and safe entry and use.
		PH2 Motor Development and Physical Support (Weight: 0.234)	The facility should provide age-appropriate challenging activities to support the development of children's muscles, bones, and cardiovascular health, promoting coordination and physical fitness.
		PH3 Age-Appropriate Design and Ergonomics (Weight: 0.325)	The facility should fully consider the physical differences and usage abilities of children of different ages, genders, and backgrounds in terms of scale, height, and force requirements.
	M1 Psychological Health Support	MH1 Sensory Activation and Exploratory Experience (Weight: 0.366)	The facility should provide multi-sensory stimulation through visual, auditory, tactile experiences to activate brain activity, enhance focus, and emotional comfort.
		MH2 Self-Building and Imaginative Play (Weight: 0.331)	The facility should encourage children to define play activities, create rules, and engage in creative and symbolic play, satisfying their desire for exploration and personal expression.
		MH3 Emotional Safety and Psychological Healing (Weight: 0.303)	The facility should create an art therapeutic and sensory comfortable environment to stimulate positive emotions, alleviate anxiety, and strengthen psychological resilience.
	S1 Social Health Support	SH1 Diverse Social Interaction Support (Weight: 0.367)	The facility should encourage children of different ages, abilities, and backgrounds to naturally interact and collaborate, supporting mixed-age socializing and community belonging.
		SH2 Family and Intergenerational Emotional Integration (Weight: 0.331)	The facility should provide opportunities for parent-child and grandparent-child interactions to strengthen emotional bonds between children and family members.
		SH3 Community Participation and Co-Creation (Weight: 0.302)	The facility should encourage children and caregivers to participate in the design, expression, and co-creation of the facility, enhancing children's participation rights, expressiveness, and sense of community belonging.

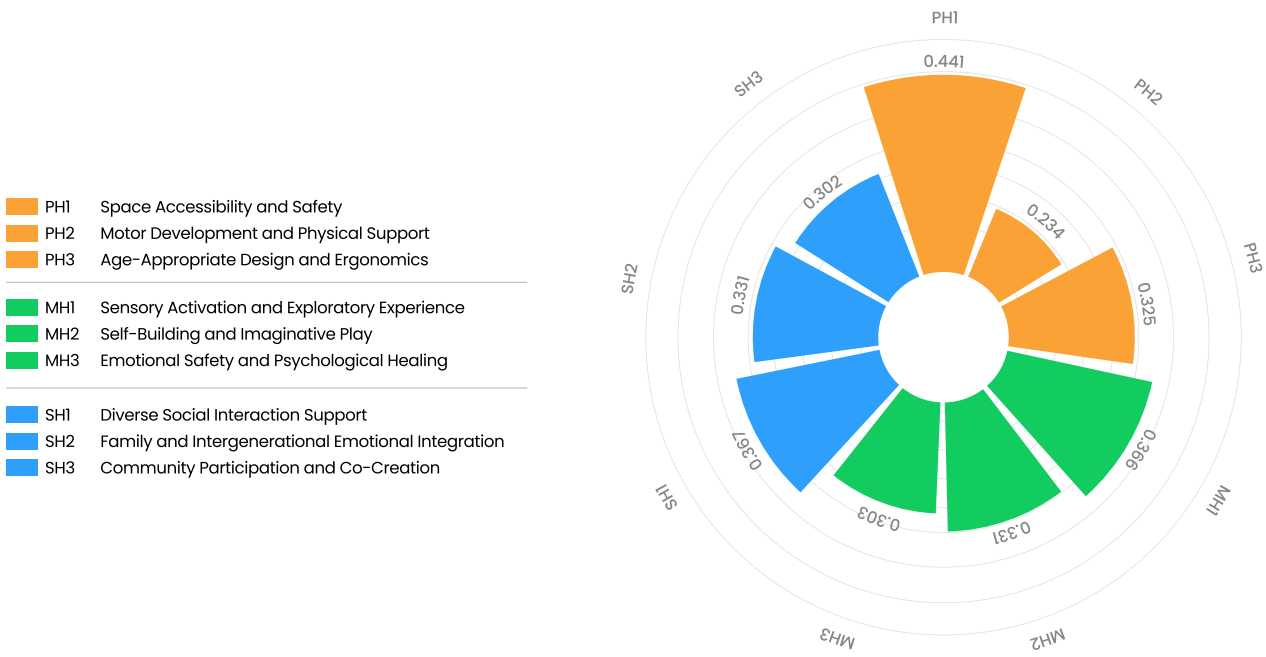

Figure 1. Weight Distribution of Multidimensional Health-Oriented Design Guidelines for Child-Friendly Community Play Facilities

In terms of physiological health support (P1), space accessibility and safety (PH1), with a weight of 0.441, is considered the most critical design factor. This indicator ensures that play facilities possess good visibility, convenient pathway access, and basic environmental safety, providing a solid biological foundation for other design elements. Motor development and physical support (PH2), weighted at 0.234, focuses on offering age-appropriate and challenging physical activities that promote the development of children's gross motor skills, skeletal strength, and cardiovascular function, which are essential for improving coordination and biological fitness. Age-appropriate design and ergonomics (PH3), with a weight of 0.325, emphasizes that physical attributes such as scale, height, and force requirements must be adapted to suit children of different ages, genders, and physical conditions, thereby enhancing the usability and inclusiveness of the facilities.

Regarding psychological health support (M1), sensory activation and exploratory experience (MH1), with a weight of 0.366, is identified as the most essential element in promoting psychological well-being. It stimulates children's cerebral cortex through multisensory engagement, improving focus and emotional comfort. Self-building and imaginative play (MH2), with a weight of 0.331, provides opportunities for children to engage in creative expression and personal rule-making, supporting psychological development aligned with children's innate autonomy. Emotional healing and psychological safety (MH3), weighted at 0.303, aims to alleviate anxiety and strengthen resilience by creating a comfortable and inclusive sensory environment that fosters positive emotional responses.

In the dimension of social health support (S1), diverse social interaction support (SH1) carries the highest weight of 0.367. It emphasizes promoting interaction and collaboration among children of various ages, abilities, and backgrounds through inclusive design, thus enhancing social skills and a sense of community belonging. Family and intergenerational emotional integration (SH2), weighted at 0.331, strengthens emotional bonds between children and their family members by providing opportunities for parent-

child and grandparent-child interaction. Lastly, community participation and co-creation (SH3), with a weight of 0.302, encourages children and their caregivers to participate in the design and co-creation of play spaces, thereby enhancing children's right to participation, expressive capacity, and sense of belonging within the community, contributing to a stronger sense of social identity.

3.2 Application

Through the application of the above model, this study conducted an evaluation of community play facilities in Wuxi, China. The results revealed key issues in the current facilities from a multidimensional health-oriented perspective. The key criteria of this empirical study indicate how the preliminary multidimensional health-oriented community play facility design guidelines framework effectively facilitated design interventions, as outlined below:

1. Questionnaire Survey: A field-based questionnaire survey was conducted to collect user ratings on the three dimensions (physiological health support, psychological health support, social health support) and their associated nine guidelines.
2. Score Calculation: The scores for each guideline were calculated based on their respective weights.
3. Weighted Average of Dimension Scores: The scores for each dimension were weighted and averaged to obtain the overall score for each dimension.
4. Identification of Gaps and Improvement Opportunities: Based on the evaluation results and field-based user behavior observations, gaps and opportunities for improvement in the facility design were identified.
5. Design Intervention Transformation: Based on the design guidelines and evaluation results, specific design interventions were derived, providing practical guidance for the design and improvement of child-friendly community play facilities.

Due to space limitations, two illustrative cases are provided below: The first example highlights critical issues related to physiological health support (P1), specifically space accessibility and safety (PH1). Field observations revealed several problems at the entrances of play spaces, including underutilized areas, unclear directional signage, and insufficient ground safety features, which hinder accessibility and pose safety risks. Design interventions can be implemented on two levels: First, underused but spacious and safe pathways can be redesigned by integrating visual cues such as numbers and playful graphics on the ground, encouraging children to walk or ride scooters to the destination, thereby enhancing spatial accessibility. Second, the existing cement ground can be replaced with soft rubber surfacing to improve safety for running, jumping, and other physical activities. Additionally, small-scale climbing structures can be installed along the route to provide children with engaging, interactive play experiences during their movement between areas (Figure 2).

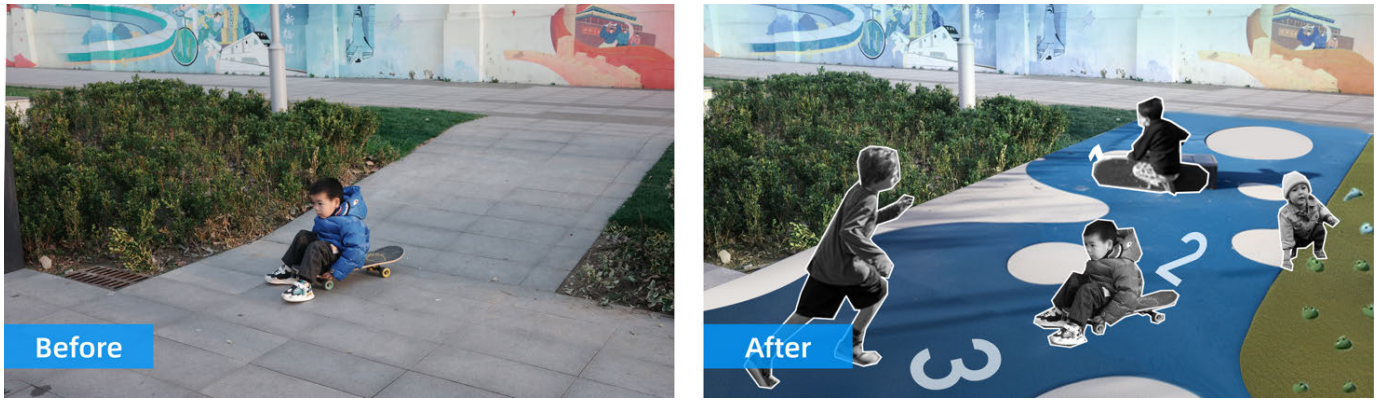

Figure 2. Conceptual Design Sketch for the Redevelopment of Wuxi Wanxin Children's Playground

The second example focuses on a solution addressing the core issue within social health support (S1), specifically family and intergenerational emotional integration (SH2). Field observations found that existing facilities primarily serve basic rest functions for children and parents, but neglect the emotional and interactive aspects of play between generations. To address this gap, design interventions can enhance the interactive and shared experience by enriching the functionality of existing features (Figure 3). For instance, a mushroom-shaped canopy structure can be redesigned to include climbing frames, light installations, and musical components. During the day, children can climb and play in the shaded area, while parents or caregivers engage in close-range interaction. At night, the lighting and music components can transform the canopy into an intergenerational interactive space, allowing families to dance together under ambient lighting, creating new opportunities for parent-child bonding and grandparent-child interaction. This promotes stronger emotional integration within families and contributes to broader social health enhancement.

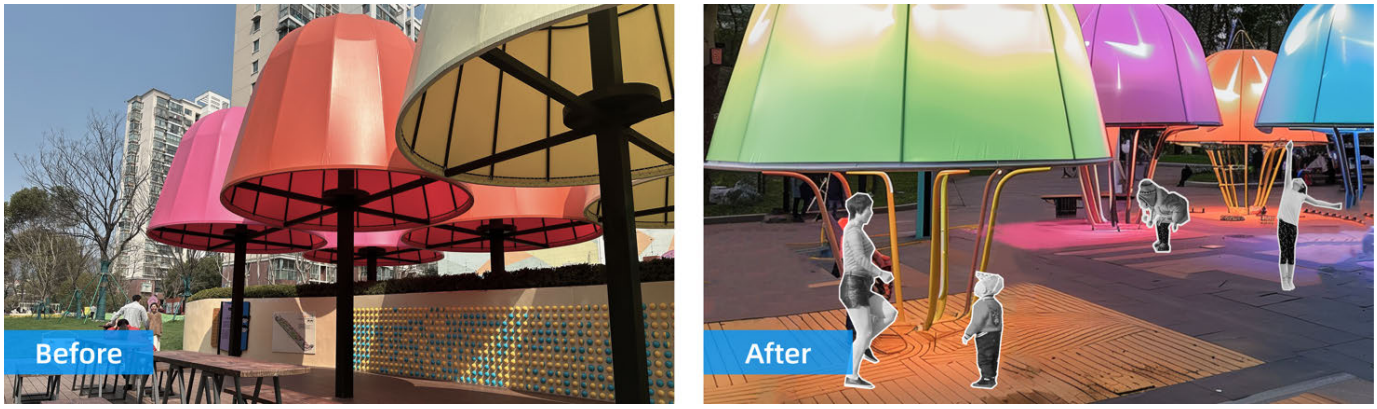

Figure 3. Conceptual Design Sketch for the Enhancement of Wuxi Dading Child-Friendly Park

4. Conclusion

As urbanization accelerates in China, promoting children's health and well-being has become a key issue in community play facility design research. This study, based on Engel's multidimensional health theory, proposes a framework for child-friendly community play facility design, focusing on physiological, psychological, and social health, including three primary dimensions and nine secondary guidelines. Through grounded theory, expert evaluation, and AHP, this study establishes a multidimensional health-oriented design guidelines framework and weights, and conducts an empirical

study in Wuxi. The results highlight that space accessibility and safety (PH1) in physiological health support is considered the most critical design element. In psychological health support, sensory activation and exploratory experience (MH1) received high weight, emphasizing the importance of multi-sensory stimulation in promoting cognitive development and emotional growth. Additionally, in social health support, diverse social interaction support (SH1) was prioritized, highlighting the positive impact of social interactions on children's social skills and sense of community.

Despite the initial results of this study in the multidimensional health framework for child-friendly community play facility design, some limitations exist. First, the empirical survey was limited to Wuxi city. Future studies could expand the sample to include more cities and regions to validate the generalizability and operability of the proposed model. Second, as the child-friendly design concept evolves, balancing the multidimensional health needs of children across different age groups and better incorporating children's participation and autonomy into facility design remain important future research directions. Future studies should refine design guidelines and explore how to comprehensively implement child-friendly design principles in urban planning and community development. With the continued advancement of child-friendly cities, integrating these design principles with sustainable development goals to achieve healthier, more inclusive, and sustainable urban environments will be a long-term research focus.

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RETHINKING USABILITY HEURISTICS FROM A FEMINIST PERSPECTIVE: A CALL FOR PLURAL PRACTICES IN HUMAN-CENTERED DESIGN

ABSTRACT | Usability heuristics shape digital interactions, yet their assumed universality raises critical questions: whose standards define consistency in UX design, and whose perspectives remain excluded? When interfaces are designed to 'match the real world,' which world is being represented, and whose lived experiences are overlooked? This paper critically examines these foundational assumptions by applying a feminist perspective to key interaction design principles. Usability heuristics, particularly those established by Jakob Nielsen, have long guided UX design by prioritising principles such as simplicity, efficiency, and consistency. However, these heuristics assume a universal user whose needs align with dominant norms, marginalising diverse lived experiences. This paper challenges the presumed neutrality of usability heuristics by applying a feminist perspective, specifically drawing on feminist standpoint theory (Harding, 1986) and Donna Haraway's concept of situated knowledge (1988). These theoretical frameworks critique the implicit biases in design standards and advocate for pluralistic, context-sensitive approaches that acknowledge systemic inequities embedded in digital systems. Through a feminist critical analysis, this study interrogates two core usability heuristics—"Consistency and standards" and "Match between the system and the real world"—demonstrating how their conventional interpretations reinforce exclusionary norms. We propose alternative definitions: adaptive consistency, which prioritises flexibility over rigid adherence to industry standards, and context-sensitive language, which emphasises inclusivity and accessibility rather than defaulting to dominant cultural conventions. These new conceptualisations challenge the hegemonic structures of UX design and advocate for a human-centered design approach that actively incorporates underrepresented perspectives to overcome the unjust epistemic vacuum they have always faced within

historically white, Western-centric, and colonial foundations of design knowledge and user research. By bridging feminist theory with practical design principles, this research contributes to the growing discourse on feminist UX and interaction design. It calls for a paradigm shift in usability evaluation—one that moves beyond a singular, universal standard toward a pluralistic framework that reflects the complexities of human experience. The implications of this study extend to UX practitioners, researchers, and policymakers, urging a reconsideration of design ethics and the role of power in shaping digital interactions. This research lays the groundwork for future explorations of inclusive usability heuristics and the deeper integration of feminist perspectives in technology design, so that human-centered design fulfils its promise, not as a selective vision, but as a holistic recognition of humanity in all its diversity and depth.

KEYWORDS | FEMINIST UX DESIGN, STANDPOINT THEORY, USABILITY HEURISTICS INTERSECTIONAL TECHNOFEMINISM, SITUATED KNOWLEDGE

1. INTRODUCTION. BEYOND NEUTRALITY: THE CASE FOR A FEMINIST UX FRAMEWORK

The field of UX design operates at the intersection of technology, human interaction, and societal norms. While traditionally framed as a value-neutral practice, critical scholarship reveals UX design as a deeply political endeavour, as technologies and the systems they encompass are never objective. They embed the values, decisions, and power dynamics of their creators, actively shaping human behaviour and societal interactions (Winner, 1980). Digital systems and their interfaces—such as applications, websites, and platforms—do more than merely facilitate interaction. They encode and perpetuate social hierarchies, cultural assumptions, and systemic inequities. As Judy Wajcman (1991) argues, technology is not an independent force but is shaped by existing social relationships, often reinforcing power imbalances rather than dismantling them. For instance, conflicts and negotiations over technological change frequently foreclose opportunities to challenge entrenched divisions of labor, particularly along gendered lines. Similarly, in UX design, the dominant frameworks often reflect the perspectives and priorities of those in power rather than a universal human experience. This recognition has prompted growing calls for more inclusive, ethical approaches to design, yet the foundational principles guiding UX practice remain largely unexamined. Usability heuristics, such as Jakob Nielsen's widely influential guidelines (1994), have long shaped the interaction design process by prioritising principles like simplicity, efficiency, and consistency. These interaction design principles, however, often assume a universal user whose needs and contexts are implicitly aligned with dominant norms. This assumption echoes Don Norman's notion that "people are the same and so the design principles are the same."(2013). While Norman acknowledges the consistency in the brain's structure, this principle fails to account for the cultural and social variations in how individuals engage with technology. Human behaviour, though shaped by universal cognitive structures, is deeply influenced by cultural, social, and historical contexts, which evolve over time. Anthropometric data, for example, has historically privileged male bodies, while cultural norms embedded in design decisions frequently marginalise those who do not conform to dominant frameworks (Criado Perez, 2019). These gaps highlight an urgent need to interrogate the universality and neutrality of

usability heuristics and to reimagine them in ways that center diverse lived experiences instead of the imperative to adhere to standardised norms. This paper aims to address this critical gap by rethinking Nielsen's heuristics from a feminist perspective, focusing on the principles: "Consistency and standards" and "Match between the system and the real world." Feminist theories, particularly feminist standpoint theory (Harding, 1986) and Donna Haraway's concept of situated knowledge (1988), offer a critical lens through which to examine the implicit assumptions underlying these heuristics. By foregrounding the knowledge and experiences of marginalised groups, this paper advocates for plural, context-sensitive design practices that challenge exclusionary norms and foster more equitable outcomes. The significance of this study lies in its dual ethical and practical contributions. Ethically, it underscores the responsibility of designers to address systemic inequities by questioning the values embedded in their tools and practices. Practically, it argues that inclusive design is not only just but also beneficial, as systems that reflect diverse perspectives are more innovative, engaging, and effective. This research pushes beyond traditional Human-Centered Design (HCD), challenging the narrow boundaries of who counts as "human" in design. It calls for a shift from merely catering to those who meet conventional standards to embracing the full spectrum of human experiences through a radically pluralistic lens.

2. STATE OF THE ART IN FEMINIST UX AND INTERACTION DESIGN

In recent scholarship, feminist frameworks are being applied to UX design to address social justice issues, especially those related to underrepresented communities. A key contribution is an intersectional techno feminist approach to community-driven technology innovation, as detailed by Shivers-McNair, Gonzales, and Zhyvotovska (2018). Their work emphasises how community-based mentorship and collaboration with marginalised linguistic and ethnic communities can inform the development of accessible and equitable technology. Further expanding on feminist theory's role in design, D'Ignazio and Klein (2020) outline feminist principles for data visualisation. Their framework challenges dominant epistemologies by centering marginalised perspectives in data practices. They propose six key principles—such as rethinking binaries, embracing pluralism, and making labor visible—intended to influence both the design process and the output of data visualisations. Garcia (2020) also advance feminist data practices by introducing "critical refusal," a concept that critiques harmful data practices and promotes alternatives. This approach involves rejecting practices that exploit or harm marginalised communities and imagining new, equitable data practices that respect community rights. The Design Justice framework, as outlined by Costanza-Chock (2018), offers another feminist critique of design processes. This framework argues that design is a key tool in shaping societal inequalities and proposes that designers prioritise underrepresented voices to ensure more equitable outcomes. Costanza-Chock advocates for collaborative, community-driven design practices that recognise the expertise of those most affected by design decisions, focusing on sustaining and empowering communities rather than reinforcing existing power structures. Additionally, Dombrowski, Harmon, and Fox (2016) propose social justice-oriented interaction design as a necessary response to complex social challenges. Their work argues that design should engage with systemic issues like inequality, focusing on the distribution of risks, harms, and benefits across different groups. By advocating for an explicit engagement with social justice, their approach seeks to prevent the entrenchment of existing inequalities and to foster more inclusive,

accountable design practices. This body of work collectively calls for a shift in design practices—whether in UX, data visualisation, or broader technology development—toward inclusive, intersectional, and community-centered approaches.

3. METHODOLOGY

This research adopts a feminist critical analysis methodology grounded in feminist standpoint theory (Harding, 1986) and Donna Haraway's concept of situated knowledge (1988), forming a robust foundation for critiquing traditional usability heuristics. These feminist frameworks challenge the assumptions underlying mainstream usability principles, particularly those established by Jakob Nielsen, and argue for the inclusion of marginalised perspectives to enhance the inclusivity and relevance of design.

At the core of this methodology is the acknowledgment that knowledge production is inherently socially situated, challenging the universality of dominant design principles. This insight emphasises the necessity of integrating a variety of perspectives to gain a fuller understanding of the systemic inequities often overlooked in conventional UX design. By incorporating these perspectives, the methodology critiques traditional practices while simultaneously advocating for a more participatory and inclusive approach to design that fosters social equity. Informed by feminist epistemology's post-positivist stance, this study emphasises research principles that prioritise the needs of disadvantaged groups, positioning feminist methodologies not only as a critique of existing practices but also as a framework for social transformation. These methodologies promote design practices that confront and dismantle power dynamics embedded in traditional UX design, striving for more just and equitable outcomes.

3.1. Feminist standpoint theory and situated knowledge: a framework for rethinking usability

Feminist standpoint theory asserts that knowledge is not neutral but socially situated, with marginalised perspectives often uncovering systemic inequities that dominant viewpoints obscure (Harding, 1986). In the context of UX design, this framework directly challenges the assumption that design principles are universally applicable. Usability heuristics are grounded in the experiences and priorities of dominant user groups, typically excluding those whose lived experiences do not align with mainstream norms. Because those in dominant positions often struggle to recognise the oppressive dimensions of their own beliefs and practices (Harding, 2004), mainstream usability heuristics risk reinforcing exclusionary standards rather than addressing the needs of marginalised users. Socially engaged design research, grounded in feminist, antiracist, postcolonial, antibourgeois, and anti heterosexist perspectives, has the capacity to disrupt the historically White, Western-centric, and colonial foundations of design knowledge and user research (Sun, 2012; Zantjer, 2015).By integrating these critical perspectives, design research can move beyond exclusionary norms and advance a more equitable understanding of usability, accessibility, and human-centered design. Haraway's concept of situated knowledge and the principle of partial perspective deepens this critique by emphasising that all knowledge is partial and shaped by the specific social positions of its producers (Haraway,

1988). In UX design, this critique targets the assumption of "neutrality" in usability heuristics which claims that consistency in design universally benefits all users. Haraway's critique of the "God trick" is particularly powerful here—this concept exposes the false claim of an objective, all-seeing perspective that, in reality, privileges dominant positions while rendering marginalised experiences invisible. By questioning who has the power to see and whose experiences are erased in the process, Haraway urges us to recognise the ideological forces that shape claims of neutrality. What she terms "the God's trick" exposes how supposedly objective perspectives are often rooted in dominant, unmarked positions that dictate what is seen and whose realities are ignored. In the context of UX design, this critique reveals that so-called universal principles—such as the belief that consistency and standards benefit all users—frequently reinforce exclusion rather than inclusion. The assumption that uniformity in interface design serves everyone equally ignores the diverse needs and contexts of users, ultimately upholding systemic inequities rather than dismantling them.

4. RESULTS

4.1. REDEFINING "CONSISTENCY AND STANDARDS"

Whose standards are we invoking when discussing consistency and standards in UX design, and which groups are these standards systematically excluding? Nielsen's heuristic asserts that maintaining consistency reduces cognitive load by aligning with familiar patterns. But familiar to whom? Jakob's Law assumes that users benefit most from interfaces that mirror existing industry conventions, but this assumption ignores the fact that these conventions have been shaped by particular cultural and historical contexts. Rather than adhering to a rigid, one-size-fits-all notion of consistency, we advocate for adaptive consistency—an approach that allows interfaces to flexibly respond to diverse user contexts, epistemologies, computer literacy levels, and modes of interaction. This means designing not for an imagined "universal" user but for a plurality of users whose experiences, knowledge systems, and ways of navigating digital spaces are equally valid and worthy of consideration.

Proposed Redefinition:
From: "Design should maintain consistency with platform and industry standards to align with users' existing experiences."

To: "Design should maintain adaptive consistency, accommodating diverse user contexts, lived experiences, and epistemologies to reduce barriers to engagement and foster inclusive interactions."

4.2. REDEFINING "MATCH BETWEEN THE SYSTEM AND THE REAL WORLD"

When we say that system interfaces should match the real world, which world are we referring to, and whose perspective defines this reality? The usability principle that system language should align with what is familiar to users assumes that familiarity enhances intuitiveness. But familiarity is never neutral—it is shaped by dominant cultural norms that determine whose experiences are centered and whose are erased. Language itself is a socio-cultural construct, reflecting the biases and hierarchies of the societies that produce it. In patriarchal systems, women's knowledge and lived experiences have been systematically devalued, leading to design practices that unconsciously replicate these exclusions through the language and structures they employ. This is not just a theoretical issue—it has direct, tangible consequences on how different users navigate digital spaces, how they see themselves reflected (or not) in interfaces, and how accessible information truly is.

Proposed Redefinition:
From: “Design should use words, phrases, and concepts familiar to the user.
Follow real-world conventions, making information appear in a natural and logical order.”

To: “Design should employ context-sensitive language that reflects and respects diverse user perspectives, literacy levels, and experiences. Rather than defaulting to dominant cultural conventions that may alienate or marginaliSe certain groups, interfaces should adopt terminology that fosters accessibility, inclusivity, and equitable engagement.”

5. CONCLUSION

This paper highlights the need to reconsider traditional usability heuristics through feminist lens. By applying feminist standpoint theory and situated knowledge, we challenge the universal assumptions embedded in existing design principles, advocating for adaptive consistency and context-sensitive language that prioritise diverse user experiences. This study contributes to the literature by bridging feminist theory with practical design principles, pushing for a more inclusive, equitable UX practice. Moving forward, it is essential to explore other interaction design principles through this perspective and continue to create digital spaces that empower marginalised voices.

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SENSE AND PRODUCT INNOVATION IN THE UPHOLSTERY SYSTEM: TOWARDS A SUSTAINABLE PARADIGM

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ABSTRACT | This paper is part of the PNRR macro-project 'Circular and Sustainable Made in Italy', and presents the structure and first results of the doctoral research in progress. The research, with the aim of proposing a new paradigm of sustainability, is oriented towards one that considers in the culture of product design the value dimension of the relationship between things, people and context made up of socio-cultural meanings that connect them in a lasting and sustainable way. The research is divided into two main phases, the desk phase of theoretical-critical construction of the state of the art and the field phase, with an experimental focus. In the desk phase, considering it fundamental to also substantiate the product design with a value dimension, a review of the transdiscplinary literature on the theme of value is conducted, considering the main contributions proposed by the economic areas to those belonging to the social sciences, as well as those specific to the design discipline. This is followed by an analysis of the case study of the Made in Italy upholstered product, understood as an extended phenomenon and a cultural macro-system, and considered emblematic for the study of the 'added' value that has made its products iconic and durable. In the field phase, the research defines the *Semantic Value-Driven Design Approach*, in which it proposes sense-making as the driver for the durability of product-systems, whose design, through the cultural chain of the good, is not merely linked to competitiveness strategies but conceives valuable goods as part of people's life context. In this phase, an original value system of reading, interpretation and design is developed, composed of a dual taxonomy (technical-historical and value-design), implemented in an interactive tool for the benefit of the design community for the identification of relations between technical-functional, productive, formal aspects, approaches to use and symbolic meanings. In this way, the social and value dimension is introduced into the world of product design, which

becomes a metric in the modalities of use and visualisation. The experimentation phase, in the first instance, critically re-reads some of MII's upholstered products through the determinants identified by the value system, attesting to the significant presence of semantic value in the products considered iconic, which therefore embody the principle of durability; in the second instance, it reports both the entire design methodology of the interactive tool and the constructed working prototype. It is configured as an original qualitative tool for the investigation and in-depth study of technical-historical and value-related themes related to an original method of literature comparison. A conclusive experimental phase of a quantitative nature is in progress, which aims to verify the recognisability of the socio-cultural determinants defined by the system within upholstered products and to assess the effectiveness of the same determinants in orienting towards an informed purchase choice.

The paper adheres to the same structure as the doctoral research, starting with an introduction and contextualisation, sets out the desk and field phase, describes the first results and the research perspectives.

KEYWORDS | SEMANTIC VALUE-DRIVEN DESIGN APPROACH, SENSE-MAKING, VALUE SYSTEM, UPHOLSTERED PRODUCT, MADE IN ITALY

1. Introduction and context

This paper concerns the doctoral research in progress, which is part of the 'Circular and Sustainable Made in Italy' macro-project, financed by the PNRR, and aims to define a new paradigm of sustainability, assumed in the concept of durability of artefacts, attributed to them through the recognition of a value, understood not only in material and functional terms, but connected to socio-cultural relational dynamics; research considers essential to substantiate even product design with this value dimension.

Since the origins of the human species, the evolution of transformative capacities has progressively accentuated the distance between man and nature, culminating in the current model of unsustainable development based on capitalist logic. The entire scientific community highlights the urgency of a transition towards more responsible consumption models, calling for a sustainability revolution (Vezzoli & Manzini, 2007; Meadows et al., 2004). Faced with the insufficiency of technological innovation in solving systemic and complex crises, there is a need for a new design paradigm capable of breaking with deterministic approaches and promoting a dynamic balance with the environment (Maiolini, 2015; Tagliagambe, 1998). In this scenario, design assumes a transformative role, called upon to respond to social needs and orient cultural change towards sustainability (Dilnot, 1982; Maldonado, 1970; Papanek, 1971; Manzini, 2015). In this context, an attempt is made to concretely contextualise the design discipline with a social character, applying it to the world of product design, on objects and experiences, shifting the focus towards a line of valorisation, identified by what are the cultural meanings of objects, advancing possible models of sustainable design. Product design is

also endowed with a socio-cultural relationship dimension linked to the interpretation, by end users, of a *semantic value*, which goes beyond the economic and technological one, identified in the production reference contexts.

2. Research desk phase

The desk phase of the research represents an analytical and theoretical moment, aimed at constructing the cultural and design context within which the Made in Italy (MII) upholstered product case study is set. It is articulated in two main directions: on the one hand, a review of the transdisciplinary literature on the concept of value, useful to theoretically ground the research hypothesis; on the other, an in-depth analysis of the Italian upholstered product-system, with particular attention to its productive, symbolic and cultural dynamics. This dual level makes it possible to frame the product as a bearer of values that cross time, contexts and practices of use, outlining the need for a new design approach oriented towards durability.

2.1 Transdisciplinary literature review

The research, through an extensive review of transdisciplinary literature (Losciale, 2024), reconstructs the concept of 'value' both from economic theories (Porter, 1985), which establish the dynamics of consumption and the rules of duration, and from the social sciences, which study the socio-cultural relations between people and things (Latour, 2008; Bodei, 2009), and, in the light of design theories, proposes this new approach to project culture. The creation of value is considered to be based on immaterial elements, linked to symbolic and relational contents, which are as important as economic ones (Addis, 2007).

2.2 The Made in Italy Upholstered Product Case Study

To support this paradigm, the research reinterprets the MII upholstered product and the phenomenon associated with it, enhancing the product within a broad notion of good, as an expression of symbolic values. This product system is enriched by that cultural value chain that incorporates and expresses specific cultures, knowledge, traditions of the territory of origin, which is affirmed thanks to an 'identity', and is responsible for creating value for the user in terms of meaning, experience, participation. Although the literature often links these products to the cultural values of MII from a managerial perspective, associated with corporate and historical values, the study identifies them as an effective case for examining the construction of meaning and 'added' value that has made them iconic and durable; MII upholstered products suggest a new design paradigm that starts from the values recognised in them in relation to current trends in use and consumption and to the product's production systems.

3. Research field phase

The field phase constitutes the research experimental heart, in which the *Semantic Value-Driven Design Approach* is proposed, an original design paradigm aimed at favouring the products' durability through the attribution of meaning. This phase is divided into two parts: a first methodological, dedicated to the construction of the value framework based on the proposed approach through the definition of two taxonomies (technical-historical and value-driven); a second applicative, which envisages the recognition of the value determinants in MII products through their critical re-reading, the

development of the value system in an interactive tool and the quantitative experimentation with users.

3.1. Semantic Value-Driven Design Approach

With the desire to make design as a socially oriented discipline concrete (Manzini, 2015; Papanek, 1971), within product design, the research presents a methodological approach, the *Semantic Value-Driven Design Approach*, aimed at the updating of design practices that focuses on the analysis of individual and collective use practices that contribute to substantiating the biography of things. The approach is characterised by a socio-cultural relationship dimension linked to the interpretation of a *semantic value*, which goes beyond the economic and technological one, identified in the socio-cultural reference contexts. The approach addresses the relational dimension that is structured between objects, people and contexts, focusing on the socio-cultural meanings that sustain durable connections. For this approach, design gives objects not only an exterior form and functionality, an *aesthetic and use value*, but above all an intimate dimension: *semantic value*, thus intersecting material culture with the meaning dimension that the product takes on in relation to user's values. The acquisition of new meanings through experience is a vector of product added value, in which design conceives goods as part of the context of people's lives and not only linked to competitive strategies: the traditional theories of sense-making (Verganti, 2009; Rampino, 2012), bring out the concrete absence of a design reading of the possible attributions of meaning in artefacts, and an interpretation is proposed.

3.2. The value system of reading, interpretation and design

For this paradigm, a value system of reading, interpretation and design is concretely proposed: a taxonomic system for recognising and mastering the technical characteristics of products that, alongside a design tool, systematises the established part of 'requirements and performance' with variants that escape a technical definition but are of a socio-cultural nature. It consists of a dual taxonomy. The first technical-historical, aims at the knowledge of the product system by operating a complex and critical classification on about 100 MII upholstered products (Losciale et al., in press). The detailed analysis carried out on the selected product models constituted a strong structured cognitive base: the careful analysis, guided by the definition of the physical-material, historical and language categories, critically supported the reflection towards a cultural reading of the product-good, allowing the identification of value aspects of a representative-symbolic nature. The artefact is assumed to be a cultural asset and a relational, symbolic and affective medium, elevating the contribution to a form of analysis inspired by the world of humanistic literature and taxonomically crystallising the intangible value aspects useful for product reading and design. The value-design taxonomy, downstream of an extensive semantic investigation of the literature pertaining to socio-cultural disciplines (with an original visual form), is composed of conceptually defined categories and determinants (Figure 1). These determinants, for the benefit of the design community, serve as guiding elements for analysis and design, as they make tangible the values that products must take on and communicate within their context.

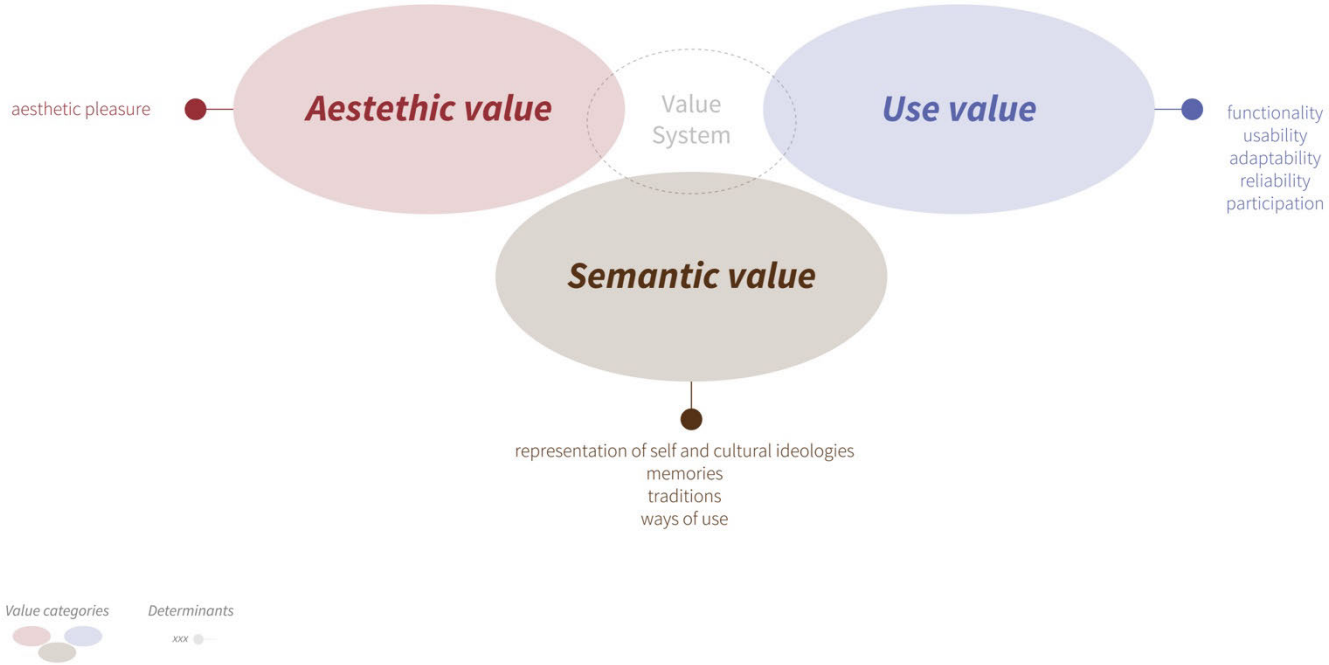

Figure 1. Value system: categories and determinants

3.3. Qualitative-experimental reading of determinants on iconic MII product

Downstream of the construction of the value system, the experimental phase of the research is constituted, in the first instance, by a critical-interpretative analysis aimed at assessing whether the determinants identified in the value system are present and how they characterise the objects of application. It is quantitative in nature and concerns a sample of 15 MII upholstered products, selected from those present in the taxonomy with appropriate criteria and is summarised by original graphical representations (Figure 2). Amongst the various possible deductions, the significant presence of semantic value in products considered iconic, which embody the principle of durability, stands out.

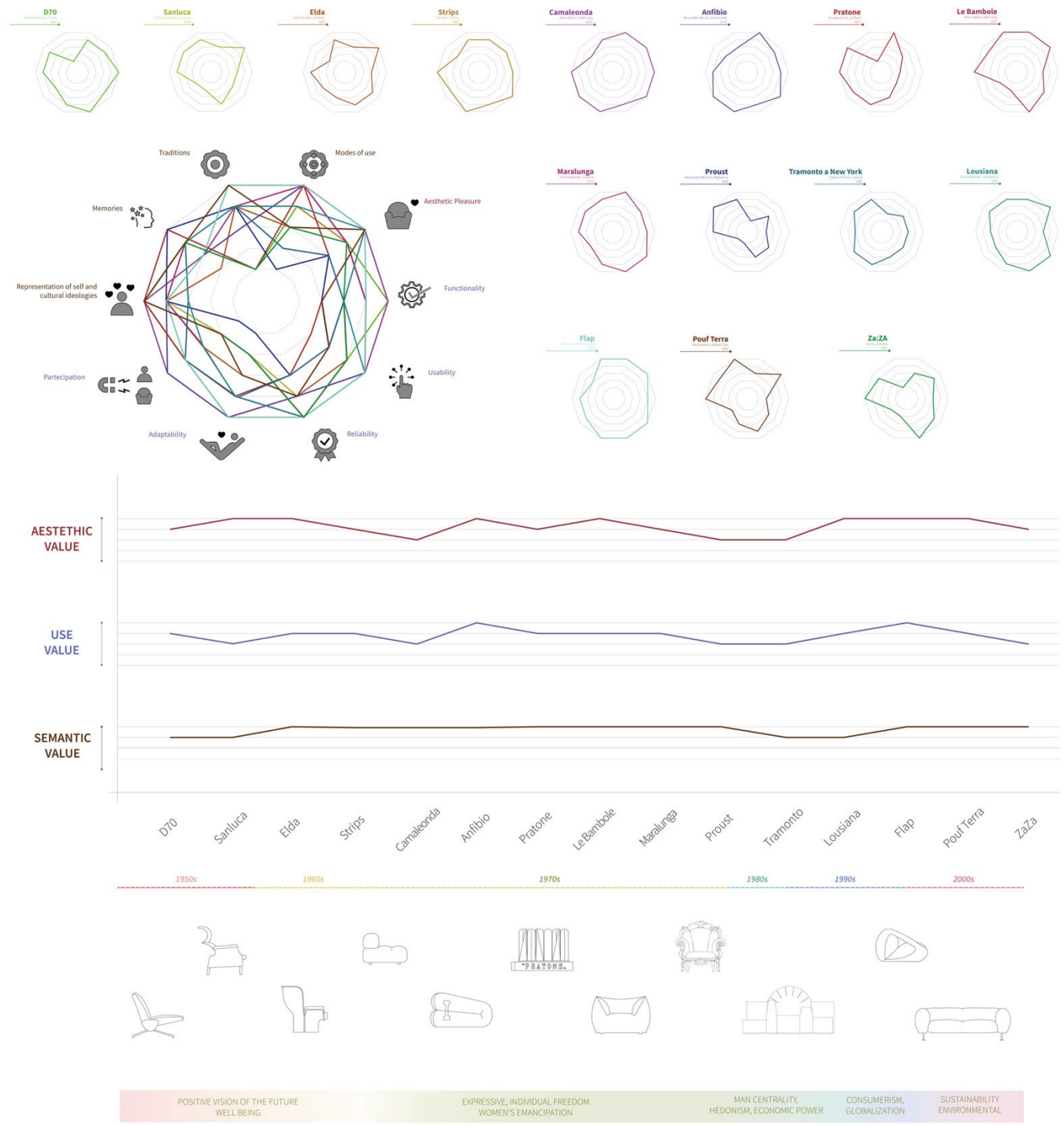

Figure 2. Qualitative reading on iconic MII products

3.4. The tool

The integration of the two taxonomies has led to the construction of a interactive tool, in Italian, which is useful to the entire design community in identifying new and transversal relationships between technical-functional, production, formal aspects, approaches to use and semantic meanings. This tool integrates technical characteristics of products with socio-cultural dimensions and systematically combines established requirements and performance criteria with variables that escape objective and technical definition. In this analysis there is an attempt to hold together the 'hard' dimensions inherent to the

technical nature of industrial design with the 'soft' ones of a socio-humanistic and sociolinguistic nature, which has led to the development of a reference metric system supported by an original, interactive, accessible and implementable visual system. Starting from a synthetic and traditional data collection method, a critical synthesis was achieved: it is not a simple database with visual access, but an intuitive support for analytical exploration, which adopts qualitative rather than quantitative tools and metrics. On the one hand, the tool highlights the value of the product in relation to the entire supply chain and the socio-cultural context of development by a critical model capable of adapting to the new sustainability requirements, which serves as an instrumental support to the mapping of the sector, revealing the interconnections between technical, production and historical aspects. On the other hand, drawing inspiration from a scientific working environment akin to the socio-humanistic area, it aims to connect qualitative variants with technical-functional and formal ones.

The preview in Figure 3 shows the original form of interactive visual use that, starting from the graphic restitution of the complex relationships between the technical-historical data, supports the value metric system of a critical-qualitative nature (Figure 4).

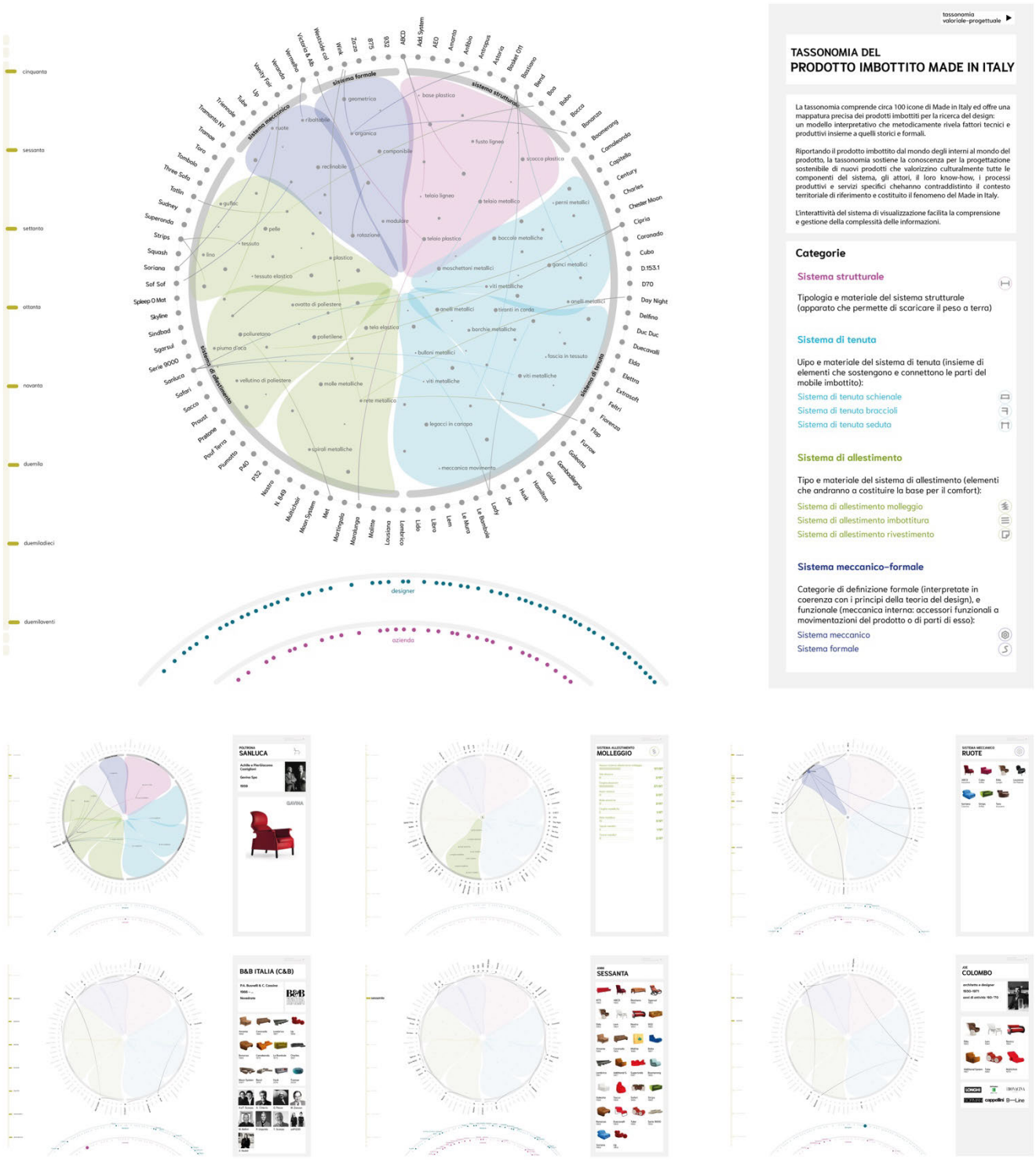

Figure 3. Preview of the interactive tool (technical-historical)

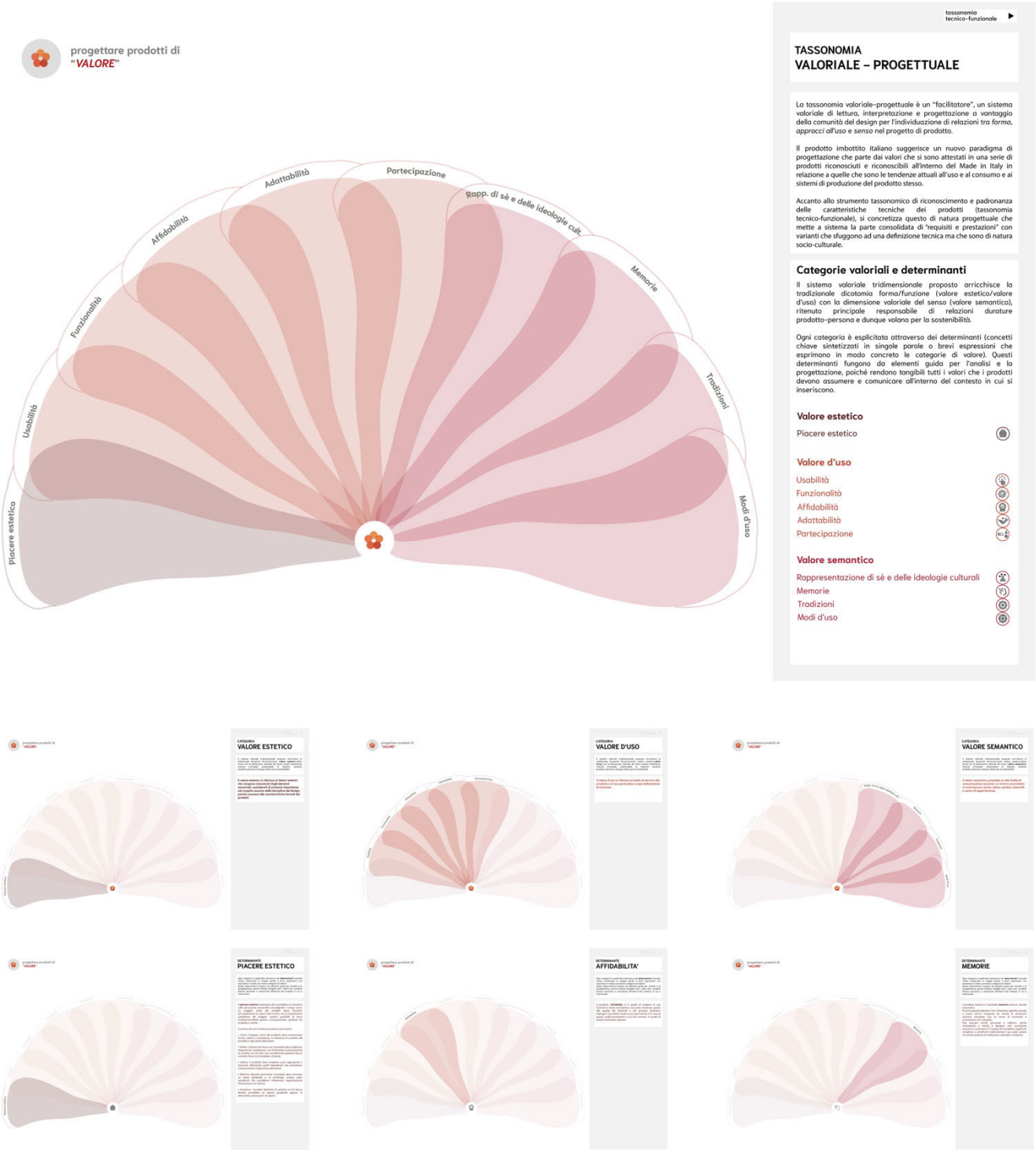

Figure 4. Preview of the interactive tool (value-design)

Furthermore, Figure 5 shows the original literature use model used to define the value framework that allows for a more accessible data comparison.

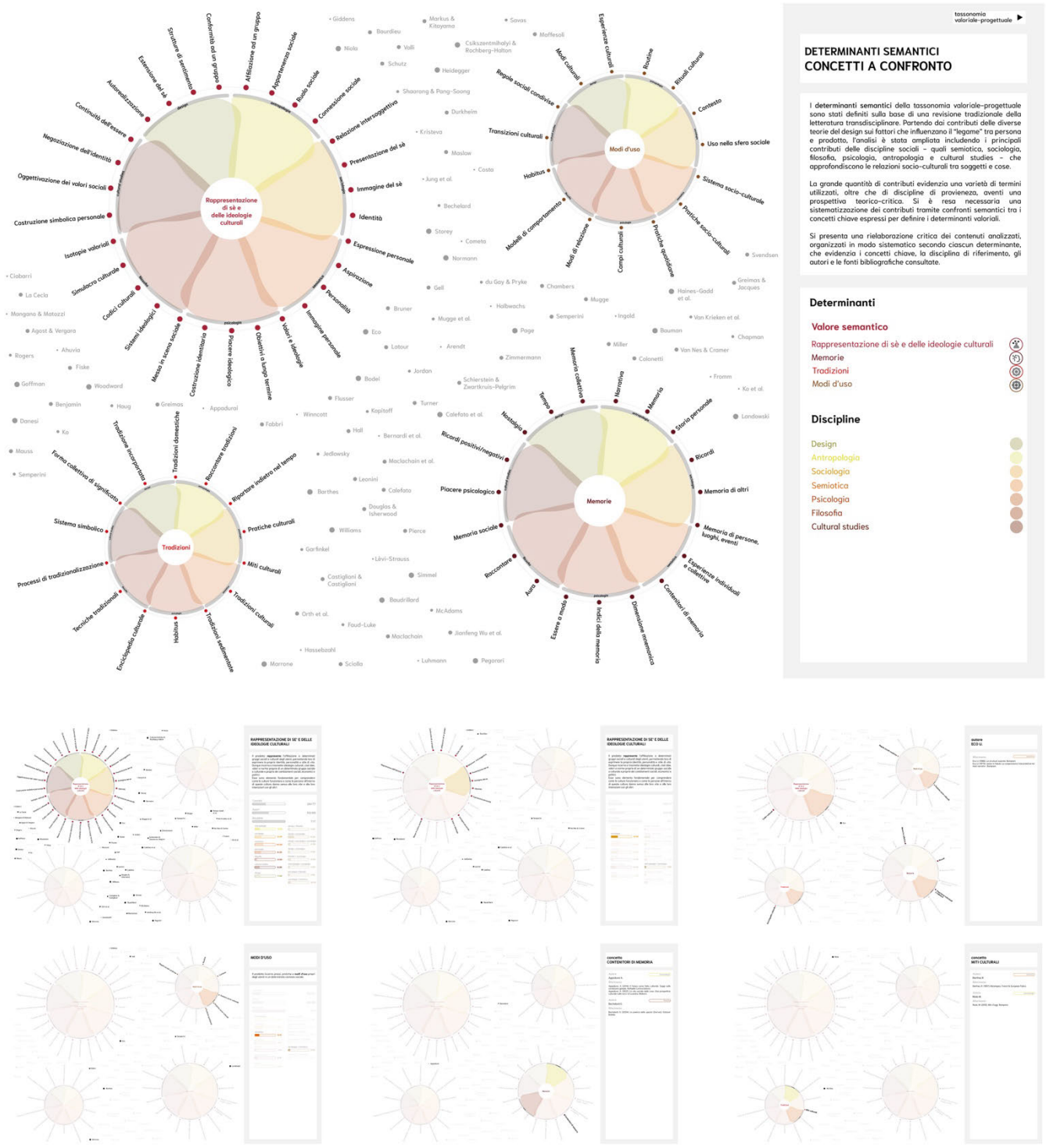

Figure 5. Interactive preview tool (literature comparison)

4. First results and future developments

The PhD research, through an original reinterpretation of the upholstered cultural asset MII, impacts the sustainable dimension with originality. By integrating a technical-historical taxonomy with a value-design metric system in an original and interactive visual tool, through the connection between technical, socio-cultural and symbolic dimensions, it not only enhances the heritage of Italian design, in a format that can also become an archive of this heritage, but also provides a critical approach to the analysis,

interpretation and design of upholstered products. The adoption of this system contributes to rethinking the value of products as a socio-cultural and relational expression, opening up new perspectives in response to complex contemporary needs for which design is called upon to offer new interpretative scenarios.

The first results of the experimental phase emphasise how durability depends not only on the technical or formal products' quality, but on the ability of products, among which MII upholstered products are emblematic, to embody recognisable and shared values. Moreover, the critical reinterpretation suggests that the value system, made interactive and the child of the *Semantic Value-Driven Design Approach*, can be an effective tool for integrating socio-cultural dimensions into the product design world useful for analysis and design. This deduction is being validated by a test with real users, which is in progress. Its objective is to assess the effectiveness of the framework of socio-cultural value determinants in the perception/recognition within upholstered products and to evaluate the extent to which these determinants direct towards a more conscious buying choice. Using the typical tools of service design, this experimentation aims to quantitatively demonstrate the potential of the methodological model constructed.

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Serious Games with AI for Education: Ethical Issues and Educational Challenges.

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ABSTRACT | The landscape of learning and training is expanding to include new types of learning methods, among which the introduction of serious games integrated with Artificial Intelligence (AI) stands out. These games, designed with educational rather than entertainment purposes, have the potential to personalize the learning experience and enhance student engagement. By adapting content and difficulty levels to individual student needs, AI fosters a more effective educational environment that promotes the development of critical skills such as problem-solving, collaboration, and critical thinking. However, the intersection of AI and serious games in education presents significant ethical challenges, including algorithmic opacity, biases, privacy concerns, and cognitive impacts. This paper examines these ethical issues and proposes a framework for their responsible use, integrating Service Design methodologies to ensure fairness, inclusivity, and transparency in the design and implementation of AI-powered serious games. The proposed approach emphasizes participatory design, iterative prototyping, and the integration of Explainable AI (XAI) to address biases, promote transparency, and ensure data privacy. By actively involving educators, students, and ethics experts in the co-design process, this framework aims to create educational tools that adhere to ethical standards and provide equitable learning experiences.

KEYWORDS | SERIUS GAME, EDUCATION, SERVICE INNOVATION, ETHICAL DESIGN.

1. Introduction

The integration of artificial intelligence (AI) into various fields has transformed numerous sectors, including education and training. Among emerging applications, AI-powered serious games are gaining attention as innovative tools for enhancing learning.

These games, designed for educational purposes rather than pure entertainment, offer unique opportunities to personalize the learning experience and increase student engagement. They represent interactive digital environments created for educational and training purposes (Narayanan et al., 2023; Sharifzadeh et al., 2020).

AI integration enables personalized learning by dynamically adapting content to individual student needs, thus fostering a more effective educational experience. The ability to adjust the game's difficulty and content based on the student's capabilities ensures a smoother and more targeted learning process. Moreover, maintaining a balance between challenge and skill enhances focus and participation. This approach also supports the development of complex skills such as problem-solving, critical thinking, and collaboration-key elements of modern and inclusive learning. (Kiili, K., 2005).

However, the combined use of AI and serious games in education and training also presents challenges and ethical concerns. How transparent are the algorithms? Are there risks of bias in AI systems? How can we protect student privacy and ensure that technology does not diminish their sense of responsibility?

The goal of this research is to provide an in-depth analysis of the ethical implications of these tools and propose solutions for their responsible and equitable use through Service Design.

2. Ethical problem of integrating Serius Game with AI in the Education

The integration of Artificial Intelligence (AI) in research and development highlights the need to ensure that human values guide technological progress. It is essential that AI be designed for the benefit of humanity while simultaneously reducing potential risks. Promoting an ethical approach to design that guarantees transparency and accountability (Adamson, Havens, Chatila, 2019) is a methodology that can also be applied to the development of serious games for education and training.

This raises a series of ethical issues that must be addressed to ensure the responsible and inclusive use of these technologies. One of the main concerns is the opacity of deep learning systems, which often function as "black boxes." This means that, while they generate results and make decisions, their internal workings remain largely incomprehensible to both developers and end users: Improving the interpretability of AI models can help reduce the risks associated with bias. However, researchers warn that such improvements may lead to a decrease in prediction accuracy. Despite progress in explainability techniques, such as LIME (Local Interpretable Model-agnostic Explanations) and SHAP (Shapley Additive exPlanations),

finding a balance between transparency and accuracy remains a significant challenge (Ronald Yu, Gabriele Spina Alì, 2019).

This lack of transparency undermines the trust of students and educators, as it makes it difficult to assess the reliability of the system or to correct potential errors. In this context, Explainable AI (XAI) (Doshi-Velez & Kim, 2017) — a set of processes and methods that enable human users to understand and consider the outputs generated by machine learning algorithms as reliable—emerges as a crucial element in making AI decisions more interpretable and understandable.

Another significant issue is bias and discrimination. Since AI learns from the data it is trained on, unbalanced or non-representative datasets can lead to distorted outcomes, disadvantaging certain groups of students. For example, an educational serious game based on non-inclusive data may generate less accurate responses for students from different cultural or socio-economic backgrounds, thereby compromising equity and inclusion (Mehrabi et al., 2021). At the same time, the collection and management of student data raise critical concerns about privacy and surveillance. These games gather sensitive information on users' performance, behaviors, and even emotions—data that, while valuable for personalized learning, could be exploited for intrusive monitoring. The risk is that educational environments turn into spaces of constant surveillance, infringing on students' right to privacy. Therefore, it is crucial that data collection and usage comply with privacy protection regulations, with clear and transparent oversight mechanisms (Dwork & Mulligan, 2013).

Beyond technical and ethical aspects, cognitive and psychological implications must also be considered. Excessive reliance on AI in serious games can diminish students' ability to develop independent critical thinking. If the system constantly provides recommendations on strategies to adopt, students may simply follow AI-generated guidance without developing their own reasoning. This is particularly problematic in education, where fostering intellectual independence should be a primary goal. Additionally, the digital divide presents another challenge. Not all students have access to the same technological resources, and the adoption of advanced serious games could benefit only those with adequate devices and digital skills, thereby widening educational inequalities (Adamson, Havens, Chatila, 2019).

It is important to consider how game dynamics influence students' ethical decision-making. Many serious games reward goal achievement through points and incentives, which may encourage students to make decisions not based on genuine ethical reflection but rather on maximizing their scores. This risk of the "gamification of morality" could oversimplify ethical choices into mere optimization strategies, limiting students' ability to develop critical and conscious thinking.

Addressing these challenges is essential to ensuring the fair and responsible use of AI in educational serious games. Adopting a Service Design approach can help create more transparent, inclusive, and privacy-respecting tools, ensuring that technology remains a means of enhancing learning and human development.

3. Proposal for an Ethical Service Design Framework for Serious Games

To address ethical issues related to serious games in education, the goal is to create an advanced design framework that integrates participatory approaches and service design principles and is based on five. pillars:

- Co-Design with Educators and Students: Actively involve end users in the design process to integrate their needs and concerns.
- Iterative Development and Participatory Testing: Use prototyping and testing cycles to ensure continuous adaptation to educational and ethical requirements.
- AI Transparency and Control: Implement Explainable AI tools and interactive dashboards to enable users to understand and monitor AI behavior.
- Inclusivity and Diversity in Content: Ensure balanced and representative datasets to prevent discrimination.
- Continuous Ethical Monitoring: Establish regular audit mechanisms to uphold ethical principles over time.

Additionally, Service design focuses on the design and management of complex services, placing the user experience at the center and promoting co-creation. In the field of education, methodologies such as Double Diamond and Service Blueprint provide a structured framework to discover, define, develop, and deploy a new version of a serious game that uses AI to contribute to training:

- 4.1 Discovery Phase

In this initial phase, particular attention is given to gaining a deep understanding of the key stakeholders involved. Stakeholders such as educators, students, developers, and ethics experts are actively engaged to identify needs, expectations, and potential challenges. The educational journey is also mapped, using tools like customer journey maps and service blueprints to visualize the entire experience and identify critical moments of interaction with the service. This allows for a focus on improving the critical touchpoints to ensure a smoother and more effective experience.

- 4.2 Definition Phase

Once a clear understanding of the context has been gained, the key aspects of the project are defined. A thorough analysis of potential ethical issues is conducted, such as the risks related to algorithmic opacity, bias, privacy, and the cognitive impact of AI on users. The aim is to address these concerns from the outset by setting clear objectives. Defining measurable indicators ensures that equity, inclusivity, and transparency are prioritized throughout the process.

- 4.3 Development Phase

During this phase, prototypes of the serious game are created and refined. Iterative prototyping and participatory testing approaches are adopted, collaborating with end users and gathering feedback to improve the interface, AI system, and overall experience. The goal is to develop a solution that effectively meets users' needs while addressing any concerns

that arise. Additionally, interactive dashboards are developed to allow users to monitor and, if necessary, adjust the AI's personalization criteria, providing greater control and transparency over the system's operation.

- 4.4 Delivery Phase

In the final phase, the project's sustainability is ensured through training activities on AI ethics and digital responsibility, aimed at both students and teachers. The objective is to provide the necessary skills for a conscious and ethical use of the technology. Furthermore, a continuous monitoring and ethical auditing system is established to ensure that the serious game consistently meets equity and transparency standards over time, with regular reviews of its performance and interventions to maintain ethical integrity.

4. Conclusion

The adoption of AI-driven serious games in education presents significant opportunities but requires a careful and responsible design approach. By integrating service design principles, it is possible to develop educational tools that are:

- Transparent and inclusive: Leveraging technologies such as XAI and interactive dashboards.

- Participatory: Engaging all stakeholders through co-design processes.

- Iterative and adaptable: Ensuring continuous prototyping and constant feedback to support product evolution.

The next steps include real-world experimentation, the establishment of shared ethical standards, and the development of auditing methodologies to continuously monitor the impact of serious games on learning and students' ethical behavior.

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The Evolution of Everyday Life: Investigating the ‘Object-Space’ Order Evolution via Computer Vision Model

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ABSTRACT | Design studies frequently concentrate on grand narratives, while common objects in daily life and their cultural meanings are often oversimplified or disregarded. In the face of these challenges, this study offers an intellectual fulcrum for designers and researchers, assisting us in re-examining the meaning of design from an alternative perspective. This research centers on the evolution of the "object-space" order in everyday life by leveraging the computer vision model. Through utilizing this technology to process image data from different time periods, the category, location, and spatial layout of objects are identified. At the micro level, the placement rules and dynamic changes of objects in space are unveiled, and at the macro level, the shaping effects of spatial functions and social culture on the "object-space" order are explored. By investigating the evolution of everyday objects and their correlation with interior space, it is beneficial for designers to comprehend the spatial relationship between occupants' behavior and objects. Theoretically, this study contributes to understanding the influence of computer technology on the domain of design research. Practically, it aids designers in creating suitable living spaces from the perspective of residents' behavior and activities.
Therefore, this study focuses on the Chinese contemporary residential interior space, combining traditional design history research methods with computer vision models. In the research process, a combination of qualitative and quantitative research is adopted. Residential interior scene photos are collected through interviews and investigations, and Multimodal Large Language Models (MLLMs) are employed as tools to explore the evolution of the “object-space” order in China since the 1980s. With the assistance of intelligent technology, the sorting, extraction, and induction of the spatial form pedigree are completed, thereby addressing issues such as subjective bias and low efficiency in traditional historical research data processing. It has been found that the "object-space"

order is significantly influenced by the development of science and technology, the transformation of lifestyle, and the shift in cultural concepts, demonstrating a trend of evolution from being dominated by functionality and practicality towards aesthetic and personalized expression. This, in turn, offers a novel perspective for understanding the changes in human lifestyle. The methodology employed in this study enables the analysis of the correlation among the three flow factors of "object-resident-space" within domestic space and can present the evolutionary trajectory of object locations. This research will put forward a new methodology aimed at exploring the correlation between objects and spatial forms in interior spaces. By taking the daily behaviors of both objects and people as the research theme, a better understanding of the impact of indoor spatial forms on daily life can be achieved.

KEYWORDS | EVOLUTION OF INTERIOR SPACE; THE "OBJECT-SPACE" ORDER; COMPUTER VISION MODEL; MULTIMODAL LARGE LANGUAGE MODELS (MLLMS).

1. Introduction

The evolution trajectory of contemporary Chinese residential space is an all-round and multilevel process, serving as a microcosmic snapshot of the national development journey since the founding of New China. In this study, the implementation of China's opening-up policy in the 1980s is regarded as a crucial turning point in time. The renewal of Chinese people's cultural concepts has emerged as a vital component of New China's modernization transformation (Xu, 2018). Western cultural concepts and ways of life have continuously streamed in, colliding with and integrating into Chinese culture. Technological advancements and applications have revolutionized the interior design approaches of modern Chinese residential buildings. The development and popularization of electronic media technology in China have given rise to a corresponding electronic media culture, which has also exerted an impact on people's daily lives, consumer culture, mass media forms, and the political system (Yang, 2024).

As commodities, objects play a pivotal role in the economic, social, and cultural elements of the capitalist system (Baudrillard, 1970). Lawrence(1982) argued that as the carriers of material things, changes in interior spaces directly mirror the shifts in lifestyle across different periods. The evolution of “object-space” order is both the outcome and the driving force behind the transformation of residential space. Meanwhile, the change in interior space is a consequence of external factors such as social, economic, and cultural changes; while the evolution of objects, in turn, influences the evolution process of interior space. Amidst the development of the social structure and cultural background, this study analyzes the continuous temporal changes in objects. The evolution process of objects clarifies the motives and mechanisms of lifestyle changes in the course of time, thus revealing the subtle changes in the daily lives and family cultures of the Chinese people since the 1980s.

During the research process, a question raised: how to efficiently integrate the complex relationships of object placement and extract object(s) that are most closely related to the evolution of interior space forms? Therefore, the research attempts to explain the elements that have the most significant impact on the material culture of the daily lives of the Chinese people. It focuses on the interior design of urban residences since the 1980s, taking the trajectory of the spatial position changes of objects within residential interiors. It explores the evolution of the living space forms of the Chinese people over the past 45 years and the impact of changes in household items such as electrical appliances and furniture on family life. By leveraging computer vision models (Dai et al., 2017), it probes into the correlative impact of objects on spatial forms in interior spaces. Taking the dynamic correlation between objects and daily behaviors as the research theme, it attempts to understand the two-way influence between interior space forms and daily life. The micro-level daily life is used to reflect the living conditions of the Chinese resident and the residential interior design during this period.

2. Methodology

2.1. Collecting Image Data through Semi-structured Interviews

Through qualitative research followed by quantitative research, this study completed the discussion on the spatial location evolution of objects in residential interior space from 1980s to 2020s (Figure 1).

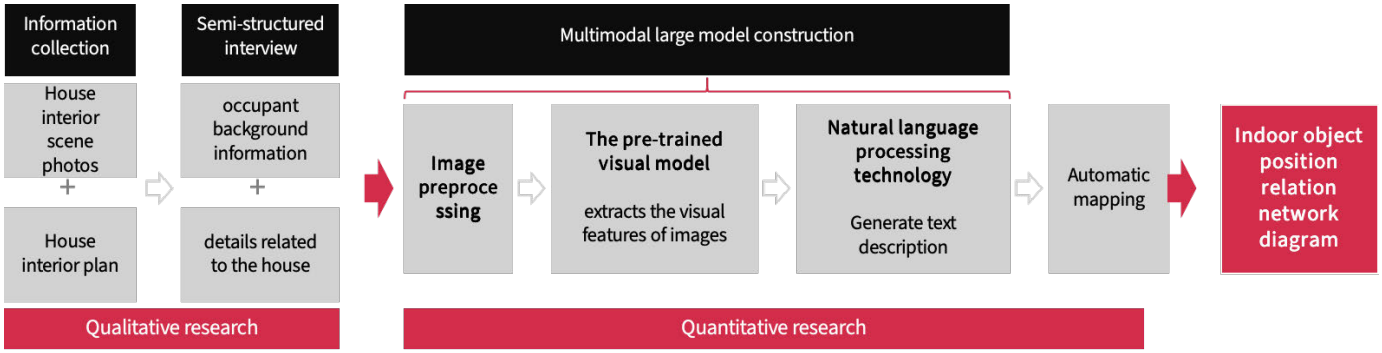
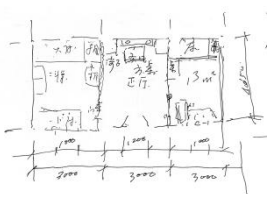
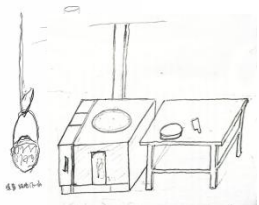
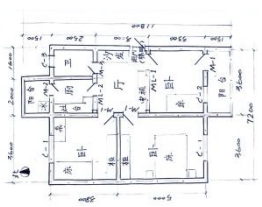
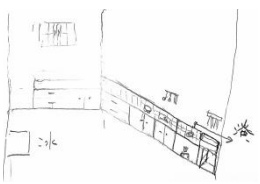


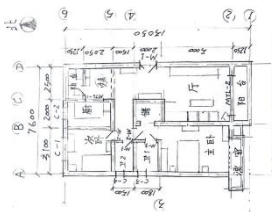
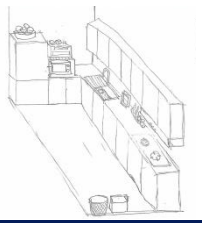
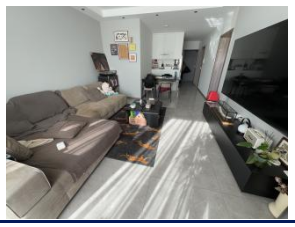
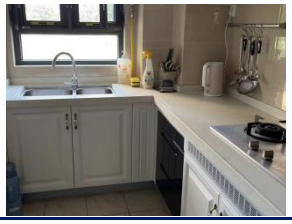
Figure 1. Research framework combining qualitative research and quantitative research.

Regarding the qualitative research stage, this study explores the transformation of the form of residential interior space and the way objects are arranged in each space. The in-depth interview subjects are families with more than three housing relocation experiences. The study recruited 45 volunteer interviewees through social platforms, social connections, and the dissemination of recruitment information. A total of 30 valid samples were selected for qualitative analysis. The number of 30 cases was determined according to the social science research method by Bhattacherjee (2012): the number should be greater than 20 but less than 50.

The information collection process asks respondents to provide three types of information: floor plans (by measuring or by recalling), detailed descriptions of living details, and photos of residential house scenes, as Table 1 (below). Among them, the photos of residential indoor scenes show the overall layout of the living environment, furniture arrangement, and decoration style, etc.; while the detailed descriptions provide information about the residents' background, such as age, gender, occupation, education level, etc.

Table 1. Respondents were asked to provide three types of information, including floor plans, detailed descriptions of living details, and photos of residential indoor scenes.

Time period	floor plans	detail drawings	House photos	
1980 -1991				
1992 -2009				

2010-2020    

Following the completion of information and data collection, semi-structured interviews were conducted with residents to examine their domestic practices, material choices, and spatial behaviors. The interviews focused on three key dimensions: (1) daily routines and lifestyle patterns, (2) selection criteria and perceptions of decoration materials, and (3) familial narratives embedded in domestic spaces. To enhance recall accuracy, the picture-induction method (Soaita & McKee, 2021) was employed, prompting participants to reconstruct past living scenarios with granular detail. Additionally, spatial usage patterns were systematically documented, including frequency of occupancy and functional differentiation among household members across distinct zones. Each piece of picture information was labeled with time and space categories according to the respondents' descriptions and sorted in chronological order from old to new. The study synthesized the time division of relevant books on the history of Chinese housing (Lv, 2003; Chen, 2013; Wang, 2022), dividing the nearly 45-year period into four stages: 1980-1991, 1992-2009, 2010-2020.

2.2. Analyzing the “Object-Space” order via Computer Vision Model

The quantitative research stage is carried out using the indoor scene pictures collected in the interview research. To improve the accuracy of subsequent analysis, the collected image data are preprocessed. This step mainly includes operations such as image denoising, contrast enhancement, brightness and saturation adjustment to ensure that the quality of each picture meets the standard. Subsequently, computer vision models were experimentally evaluated to extract visual features from the image dataset, with performance metrics systematically compared across architectures. Results indicated that ResNet demonstrated superior accuracy and computational efficiency relative to alternative models, leading to its adoption for subsequent object recognition tasks. In parallel, textual data were analyzed using natural language processing (NLP) techniques to extract semantic patterns and contextual relationships. Recurrent neural networks (RNNs) were used to process sequential data. These networks can capture the sequential dependencies in the text and generate coherent sentences. By leveraging the pre-trained word embedding technology, words were converted into continuous vector representations, and the relationships between objects in the pictures were generated into text descriptions.

The results obtained from the multimodal model were integrated through automated mapping to form a complete network diagram of the positional relationships of indoor objects. This network diagram can not only clearly display the distribution of items in the room in the provided images, but also reflect the classic combination patterns between object-object and object-space in different time periods, thus helping researchers better understand the correlations among the three flow factors of "object-occupant-space" (Figure 2).

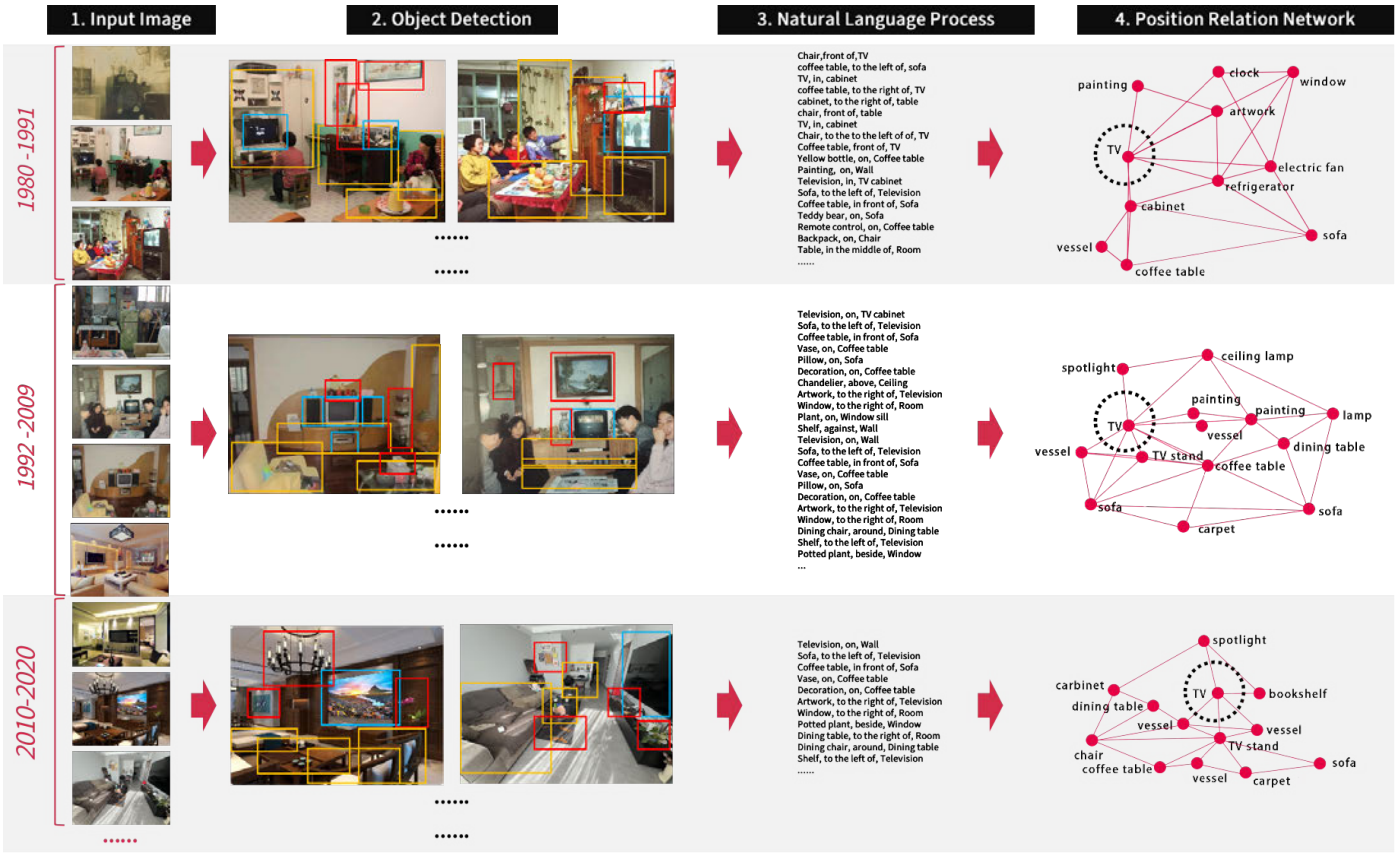


Figure 2. understand the correlations among the three flow factors of “object-occupant-space” through computer vision model.

3. Discussion

The images labeled as living-room spaces in the data, it can be observed that the combination of living-room items centered around "television-coffee table-sofa" exhibited a certain stable relationship from the 1980s to the 2010s. This classic combination of "television-coffee table-sofa" is a modern classic arrangement that transcends factors such as the occupations of Chinese people and the types of housing, and it still holds true today. This reflects the important position that color televisions play in the daily lives of the Chinese people. Moreover, with the increase in housing area, this spatial organizational relationship has been further strengthened.

In recent years, although the emerging interior design trends of "LDK" (Living-Dining-Kitchen) and "De-living-room-ization" have provided another possibility for the organizational order of family public spaces and have been applied in some families, the spatial combination centered around the television remains a model for the family spaces of modern Chinese residences. It has not been replaced by the popularity of electronic devices such as smartphones and tablets. At the same time, the latest samples of surveyed family spaces also show that the increasing use of projector equipment is gradually replacing traditional screen televisions. Based on an analysis of literature and design industry trends, as another form of audio-visual equipment, the projector makes the object-organizational relationship in the living-room space more flexible, causing the "television-coffee table-sofa" combination to evolve into combinations such as "bookcase-coffee table-sofa" and "display cabinet-coffee table-sofa".

On the other hand, through the images of dining spaces and analyzing the relationship network between furniture and objects, it can be concluded that the furniture in this space has shown an "inverse" evolution from mobile to fixed. In traditional spaces, the way of arranging furniture reflects a faithful image of the family and social structure of an era. For example, the typical bourgeois interior furnishings express the patriarchal system (Baudrillard, 1968). In previous design concepts, it was believed that the transformation from fixed furniture to movable furniture was a manifestation of design modernity (Curtis, 1996). However, in modern China, this difference from the Western development trajectory indicates that the organizational relationship of Chinese family spaces has transformed from disorder to order, forming its own unique style characteristics. The hierarchical relationship of the space is an important factor influencing the frequency of appearance of different types of objects in the space. Since the per capita housing area in China was only 15 square meters in the 1980s (Man, 2011), the functional distribution in the living-room space was chaotic, including functions such as receiving guests, dining, storage, and display. The personalization of the space makes the objects in the family not only the physical structure itself but also a symbol of the self (Marcus, 1995). With the expansion of housing area and the increase in the number of rooms, the network structure of objects in family spaces has been gradually constructed, and it has formed distinct characteristics of the times against the backdrop of the economic, political, and cultural context of the era.

4. Conclusion

This study has sparked further contemplation: Can the application of computer deep-learning technology in design history research assist people in better understanding residential space design and family culture? This paper conducts research on the evolution of interior space objects in sample families. From the current research, the characteristics of family culture and daily life of these families from the 1980s to the present can be discerned. Despite differences in their occupations and social backgrounds, overall, the indoor objects and their spatial organizational relationships within the interior show varying degrees of similarity. Based on the identification of interior space objects by computer vision and the construction of relationship networks, this study interprets the two-level change trajectories of the physical indoor environment of daily life and the implicit family culture.

In future, research will focus on the impact of housing area on living behaviors. On the other hand, the trailing nature of behaviors after an increase in housing area also reflects the reverse impact of past behavioral habits on new residential spaces. It will also broaden the research perspective on objects, paying attention to whether small objects that have been overlooked in the past have a significant impact on the form of interior space. For the growing number of indoor designs that develop spatial design strategies around the topic of lifestyle, it is recommended to adopt a bottom-up approach to truly understand and plan family culture and living behaviors. This also requires future designers to possess a more comprehensive multi-disciplinary knowledge framework. This study provides designers with a new research method and vision, offering a more traceable basis for future daily-life designs.

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The Material Culture of Lace: An Overlooked Heritage in Chinese Everyday Design

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ABSTRACT | This paper examines the overlooked material culture of lace within Republican-era (1912–1949) Chinese domestic interiors, offering a critical reassessment of its significance in the development of everyday design practices. While traditionally dismissed as a gendered craft or minor decorative art, lace functioned as a key element in shaping the aesthetic sensibilities and material routines of urban middle-class households. Drawing on archival photographs, period advertisements, and craft manuals, this study investigates the dual role of lace as both a visual embellishment and a utilitarian object embedded in domestic labor. In the Republican household, lace enhanced spatial harmony, visual softness, and symbolic refinement, while simultaneously protecting surfaces and materializing women's economic and affective contributions through handwork. These layered functions are analyzed through the lens of material culture theory and feminist design history, which situate soft textiles as active agents in the negotiation of modern domesticity. By focusing on household lacework as a hybrid design practice—situated at the intersection of gender, class, and evolving aesthetics—this paper argues for an expanded understanding of Chinese design history. It calls attention to the significance of soft materials, the underexplored domestic sphere, and the largely invisible labor that sustains everyday beauty and order. In doing so, the study repositions lace not as ornamental excess, but as a culturally encoded and socially meaningful design artifact.

KEYWORDS | Lace, domestic design, Republican China, material culture, gendered labor, textile aesthetics

1. Introduction

Lace, a delicately patterned ornamental textile long associated with femininity and refinement, occupies an ambiguous and often overlooked place in Chinese design history. Despite its widespread presence in fashion, home décor, and social rituals throughout the twentieth century, lace has been consistently marginalized in academic narratives—frequently dismissed as a gendered craft or decorative excess. This marginalization reflects broader biases in design historiography, which, as Adrian Forty (2012) argues, tend to privilege monumental architecture and industrial materials over the vernacular and domestic. Similarly, Judy Attfield (2000) and Daniel Miller (1991) have emphasized the cultural significance of everyday objects, arguing that material culture constitutes an essential interface between personal identity and social structure—especially within the home.

This paper contributes to this growing field of material culture studies by investigating the design and social meanings of lace in modern China. While the larger research project examines the historical trajectory of lace from the late Qing dynasty to contemporary digital craft revival, the present study focuses specifically on the Republican era (1912–1949), a period of rapid modernization, shifting gender roles, and middle-class expansion. Within this context, lace emerged as both an aesthetic and utilitarian feature of domestic interiors. It was not merely decorative, but actively shaped how households performed ideals of refinement, propriety, and modern domesticity.

By concentrating on lace in the home—rather than in fashion, export trade, or institutional settings—this study addresses how everyday materials functioned as agents of meaning-making within Republican society. Domestic space, as Attfield (2000) notes, is a gendered and emotionally charged environment, where soft objects such as curtains, cushions, and lacework encode systems of value. Lace played a subtle yet vital role in negotiating visual order, moral economy, and social aspiration. Often handmade by women, it embodied affective labor and taste-making, and served as a means of participation in the aesthetic configuration of middle-class modernity.

This inquiry draws on a range of interdisciplinary sources, including archival photographs, newspaper advertisements, missionary-led domestic education manuals, and household handcraft guides. Works such as Earnshaw's Lace in Fashion (1988) provide crucial historical grounding for understanding lace's evolution as a textile genre, while contemporary scholarship (Miao, 2022) has begun to chart its understudied trajectory in the Chinese context. Through this empirical and theoretical synthesis, the paper argues that lace in the Republican Chinese home was not a passive embellishment, but a dynamic and multifunctional material—central to the visual and practical experience of modern domestic life.

2. Theoretical Framework and Methodology

Judy Attfield's work further informs the study's conceptual grounding. In Wild Things (2000), she argues that domestic objects—sofa cushions, curtains, and other "soft things"—convey social identity and cultural values, often through gendered codes. Lace, in this sense, operates as a medium of "feminized material culture," situated in spaces traditionally associated with women's responsibilities and creativity. This paper extends Attfield's insight to the Republican Chinese context, where lace emerged as a flexible material for navigating shifting ideas of modernity, respectability, and aesthetic propriety.

Methodologically, the research adopts a qualitative, multi-modal approach:

Archival visual analysis: Republican-era pictorials such as Liangyou (The Young Companion) and Linglong frequently featured staged photographs of model homes and middle-class lifestyles. These images serve as primary visual evidence of lace in situ—draped over furniture, layered on windows, and arranged in still-life compositions that blend decor and domestic symbolism.

Textual analysis of advertisements and consumer materials: Newspaper ads (e.g., Shen

Bao) and home service catalogs often promoted lace as part of a modern, tasteful lifestyle. These texts reveal how lace was marketed to urban consumers, with an emphasis on cleanliness, softness, and moral domesticity.

Publications such as The Complete Biography of Pastor Guo Xiande (Lian, 1940) and missionary-led domestic education curricula provided instructions on making and using lace. These sources illuminate how lace-making was embedded in gendered practices of labor and self-improvement.

Contextual reading of secondary literature: Studies on gender, material culture, and modernity in Chinese design history offer the broader interpretive frame for situating lace in its social and historical milieu.

Throughout, the study maintains a critical attention to the tension between visibility and invisibility: lace is both a visible design object and a sign of hidden labor; a visual symbol of refinement and an index of women's affective and practical labor. By foregrounding these dynamics, this research seeks to elevate lace as a serious object of study—one that bridges aesthetics, utility, and the politics of domestic space.

3. Aesthetic Functions of Lace in Republican Household Design

The aesthetic deployment of lace in Republican-era households was a direct reflection of urban China's emerging middle-class aspirations, especially as they intersected with ideals of modernity, refinement, and feminine respectability. Far from being a mere decorative indulgence, lace was a critical component of what Judy Attfield has termed "gendered aesthetics"—where women's contributions to the visual and affective shaping of domestic space were central to the cultural production of modern life (Attfield, 2000).

In this period, domestic interiors became sites of performance. Women curated home environments as a reflection of both inner moral order and outward social standing. Lace, with its intricate patterns and soft visual appeal, was a flexible material for achieving a look of civility, cleanliness, and gentle modernity. In Liangyou pictorials from the 1930s, lace consistently appears draped over dining tables, dressers, armchairs, piano tops, and mantelpieces. It was not placed randomly—it softened architectural hard lines, added visual rhythm to furniture arrangements, and subtly diffused natural light when hung as curtains. Photographs often paired lace with polished wood, porcelain, and cut flowers, reinforcing a domestic aesthetic rooted in both nature and refinement （Figure 1）.

（a） （b） （c）

Figure 1. Lace in interior space （a）Lace on the dining table； （b）Lace on the table； （c）Living room of wealthy and wealthy people in Peking (Beijing) of the Republic of China

This visual culture resonated strongly with Confucian-inflected ideals of womanhood, where the well-managed household was an extension of feminine virtue. Lace enabled a

new mode of expression for urban women, offering them low-cost access to a decorative material that signified taste, care, and cultivation. Unlike furniture or architectural modifications, lace textiles could be easily changed, handmade, or customized—giving women control over their environments without requiring structural changes. In this way, lace was part of a larger feminized materiality, allowing for the assertion of visual agency within constraints.

Furthermore, lace aesthetics signaled a hybrid modernity. Though lace originated in Europe and was initially viewed as foreign or elite, by the 1920s–30s it had been absorbed into Chinese sensibilities through localized styles and domestic production. Shanghai workshops produced lace with both Western floral motifs and Chinese iconography—bamboo, plum blossoms, phoenixes—integrating aesthetic traditions. These hybrid designs adorned qipao collars and dressing-table skirts, exemplifying how lace was recontextualized within Chinese domestic visual codes（Figure 2）.

（a） （b） （c）

Figure 2. Chinese localized lace（a）Western floral lace；（b）Chinese floral lace；（c）Chinese floral lace

Finally, aesthetic choices in lace were never entirely about decoration—they were about cultural values. A lace-draped table suggested refinement and order; lace-trimmed collars on qipao exemplified a feminine ideal that fused elegance with modernity. These choices did not merely reflect taste, but actively produced it—embedding design aesthetics within social codes of respectability and gendered identity. To remove lace would be to diminish the visual narrative of "good taste." Thus, aesthetic function was not superficial: it was deeply implicated in processes of class identity formation, gender roles, and the vernacular language of everyday design.

4. Practical Dimensions: Lace in Domestic Labor, Maintenance, and Social Use

While lace served clear aesthetic purposes, its functionality within the Republican home was equally crucial—and often overlooked in historical narratives. Lace was not just to be admired; it was to be used, washed, repaired, and remade. In this way, lace illustrates how design objects often operate on both symbolic and practical registers simultaneously.

One of the most obvious practical functions of lace was surface protection. In household

management guides like Funu yu Jiating (《妇女与家庭》, "Women and the Home") lace coverings were recommended for wooden furniture, mirror tops, dressers, and even food trays to prevent dust, moisture, and oil stains（Figure 3-a）. These were not just decor but part of a regimen of care. Armrest doilies and sofa backs protected fabrics from wear caused by daily use. White or ivory lace made dirt visible—prompting regular cleaning, reinforcing household hygiene, and performing "visible cleanliness," a critical ideal for the modern housewife.

Lace also intersected with women's domestic labor in both unpaid and income-generating forms. In vocational education and missionary-led domestic science programs during the Republican era, lace-making was commonly taught alongside embroidery, knitting, and sewing. These handcrafts were promoted not only as practical household skills, but also as moral and aesthetic disciplines. Making lace at home was widely encouraged as a way to reduce household expenses, decorate living spaces, and fill leisure time with productive, virtuous activity aligned with ideals of feminine refinement and thrift.

More than just self-sufficiency, lace also entered the informal economy. Oral histories from regions such as Suzhou and Guangzhou recount how women made lace for local markets, boutiques, and middlemen who exported decorative textiles abroad. These tasks, performed in the home, blurred the lines between labor and leisure. Lace-making was part of what feminist scholars call the "shadow economy"—unrecorded but essential to the household and local economic system.

The social utility of lace was also significant. Lace table runners and doilies were common items in wedding dowries, birthday gifts, and housewarming presents（Figure 3-b）. Their presence symbolized a woman's domestic skill, refinement, and preparedness for married life. Giving lace was giving care—both materially and symbolically. In this sense, lace became a vector of emotional labor and social continuity.

（a） （b）

Figure 3. （a）Lace in home decoration；（b）Lace veil in wedding photos

Advertising further reflected lace's dual functionality. In 1930s newspaper ads, lace was often marketed alongside everyday household goods such as soap, starch, and linen—emphasizing its role not as a luxury, but as a modern domestic necessity. These advertisements promoted lace as affordable, practical, and morally aligned with ideals of cleanliness and feminine care. It functioned as a visual shorthand for the well-managed home, embodying both aesthetic appeal and domestic virtue.

In sum, lace's practical roles were deeply gendered and embodied. They reflect how women navigated domestic expectations by transforming mundane labor into beauty and necessity into culture. Far from being frivolous, lace was an efficient, multifunctional, and deeply social material—quietly structuring the everyday life of modern households.

5. Conclusion

This paper has examined lace as a dual-purpose material—decorative and practical—within Republican Chinese domestic interiors. It has argued that lace was more than mere ornament: it functioned as an active agent in shaping household aesthetics, labor practices, and social relations. Its role in beautifying space, preserving objects, structuring gendered labor, and reinforcing social ties reveals the complex functions of soft materials in everyday design history.

The study also challenges traditional boundaries between "design" and "craft," suggesting that household textiles like lace should be reintegrated into the narrative of Chinese design modernity. Through their ubiquity, accessibility, and adaptability, lace objects participated in building modern domestic life—one not defined by monumental buildings or iconic objects, but by the subtler texture of daily existence.

Contemporary interest in lace has re-emerged through digital craft platforms, e-commerce, and cultural heritage preservation programs. The revival of handmade lace in cities like Chengdu and Suzhou speaks to a renewed appreciation for craft-based aesthetics and sustainable design. These trends echo the Republican-era use of lace: personal, local, gendered, and situated within evolving domestic values.

By uncovering the material and cultural history of lace in Chinese homes, this study contributes to a broader understanding of how design, labor, and everyday life intersect through textiles. Lace, as a medium of care, labor, and meaning, offers an intimate entry point into the design history of modern China.

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THE UNTAPPED POTENTIAL OF EDIBLE WILD PLANTS IN SUSTAINABLE FOOD SYSTEMS.

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ABSTRACT | Ensuring global food security amidst climate change and environmental degradation necessitates a shift towards sustainable and resilient food systems. Edible wild plants, often dismissed as weeds, represent a largely untapped resource with significant potential to diversify and strengthen food supplies. These plants thrive without intensive agricultural inputs, offering rich nutritional profiles with higher concentrations of essential vitamins, minerals, and bioactive compounds compared to many conventional crops. Their resilience to environmental stressors, such as drought and soil degradation, makes them particularly valuable in mitigating the adverse effects of climate change while promoting biodiversity and ecosystem services.

This study synthesizes existing literature and case studies to assess the role of wild edible plants in sustainable food systems. Findings indicate that integrating these plants into mainstream food production can enhance food security, particularly in vulnerable communities where access to conventional crops is limited. Their inclusion supports biodiversity, ecosystem resilience, and cultural heritage preservation, as traditional knowledge surrounding their identification, preparation, and medicinal uses holds immense value.

Despite their advantages, challenges remain in their wider adoption. Key barriers include a lack of awareness, potential toxicity concerns, and the risk of overharvesting. Addressing these challenges requires comprehensive education initiatives, scientific research on nutritional properties and safety, and the development of sustainable harvesting practices.

European case studies, such as those in Sicily, highlight successful integration into local

diets and economies. The commercial potential of wild edible plants, through sustainable harvesting and market inclusion, can provide economic opportunities, particularly for rural communities. To unlock their full potential, a coordinated effort involving policymakers, researchers, and local communities is essential. By promoting the sustainable utilization of edible wild plants, food systems can become more diverse, resilient, and ecologically responsible, ensuring long-term food security and environmental sustainability.

KEYWORDS | EDIBLE WILD PLANTS, SUSTAINABLE FOOD SYSTEMS, ECOLOGICAL RESILIENCE, COMMUNITY EMPOWERMENT

1. Introduction

The imperative to ensure global food security in the face of accelerating climate change and escalating environmental degradation necessitates a critical re-evaluation of contemporary food systems and the exploration of alternative, sustainable food sources. While conventional agriculture has undeniably augmented food production, its reliance on monoculture, synthetic fertilizers and pesticides, and intensive irrigation has precipitated biodiversity loss, soil erosion, and water pollution (Knorr et al., 2020). Given these challenges, a transition towards more resilient and sustainable food systems is paramount, with a key element being the diversification of food sources and the embracing of ecologically sound agricultural practices (Marchetti et al., 2020). Edible wild plants, especially those commonly thought of as weeds are, in my opinion, a significantly under-utilised resource that could make a significant contribution to sustainable food systems.

2. Methodology

This paper employs a qualitative synthesis of existing literature including peer-reviewed scientific articles, ethnobotanical surveys, and applied case studies. Key areas of focus include nutritional composition, ecological benefits, traditional knowledge systems, and the ethical and design-related implications of integrating edible wild plants into contemporary food systems. Special attention is given to how design research, ethical leadership, and systemic innovation can facilitate such integration.

3. Discussion

3.1 Nutritional and Ecological Advantages

Edible wild plants, often overlooked in modern agricultural practices, possess immense potential to diversify and strengthen sustainable food supplies (Ebert, 2022). The integration of wild edible plants into existing food systems offers multifaceted benefits, stemming from their intrinsic nutritional profiles and remarkable ecological resilience. Many wild edible plants exhibit nutritional compositions that rival, and in some cases surpass, those of conventional crops, often boasting higher concentrations of vitamins, minerals, antioxidants, and fiber. Furthermore, incorporating a wider variety of edible plants into diets can serve as a potent strategy to combat nutritional deficiencies, especially for vulnerable populations in developing countries where the intertwined challenges of poverty and climate change exacerbate the precariousness of food security (Nakano et al. 2024).

Ecologically, wild edible plants are often better adapted to local environmental conditions than domesticated crops, demonstrating enhanced resistance to pests, diseases, and climate-related stresses such as drought and flooding (Tahir et al., 2023). Their ability to thrive without intensive inputs like fertilizers and pesticides reduces the environmental footprint associated with food production, promoting biodiversity and fostering

ecosystem resilience. For vulnerable populations, wild edible plants can be critical in ensuring food availability during periods of crop scarcity, enhancing food sovereignty and security, and providing essential nutrients (Nakano et al., 2024). Beyond their direct contribution to human nutrition, the inclusion of wild plants in agricultural landscapes can bolster ecosystem services by providing essential food and nesting resources for pollinators and natural enemies of pests (Schroeder et al., 2024). Wild edible plants, which are native plant species, grow naturally in their environment without being cultivated. They have been integrated into human diets and traditional food systems since ancient times, representing a reservoir of botanical knowledge accumulated over generations. The conservation of wild edible plants is a crucial step in preserving indigenous knowledge, investigating nutritional values, understanding potential side effects, and ultimately contributing to their sustainable utilization.

Edible wild plants often possess nutrient profiles that rival or surpass conventional crops, being rich in essential vitamins, minerals, fiber, and antioxidants (Zhang et al., 2021). For example, species like purslane (*Portulaca oleracea*) offer high levels of omega-3 fatty acids and and nettle (*Urtica dioica*) in iron, respectively. These nutritional benefits are particularly significant for marginalized populations facing food insecurity and malnutrition (Nakano et al., 2024).

Ecologically, wild edible plants are adapted to thrive without chemical fertilizers or pesticides, making them highly sustainable. Their ability to grow in marginal environments supports biodiversity and enhances ecosystem services such as pollination and soil fertility (Tahir et al., 2023; Schroeder et al., 2024). As climate change increasingly threatens conventional crop yields, the resilience of wild species provides a viable alternative for both rural and urban food systems.

Wild edible plants present a diverse palette of culinary possibilities, characterized by unique flavors, textures, and nutritional profiles that can enrich and diversify modern diets. The culinary attributes of wild edible plants are as diverse as the ecosystems they inhabit, offering a spectrum of flavors and textures that can be creatively integrated into both traditional and contemporary dishes. For instance, the succulent leaves of purslane (*Portulaca oleracea*), a ubiquitous weed in many global regions, offer a refreshing, slightly acidic and saline flavor profile, rendering them a versatile addition to salads, soups, and even pickled preparations. The tender shoots of stinging nettle (*Urtica dioica*), once properly blanched or cooked to deactivate their stinging trichomes, transform into a palatable vegetable with a flavor profile reminiscent of spinach, lending themselves to culinary applications such as creamy soups, savory pies, and vibrant pesto sauces. In many cultures, wild edible plants are deeply interwoven with traditional culinary practices, serving as defining ingredients in regional dishes and holding a pivotal position in cultural festivities and food traditions. The accumulated knowledge regarding the identification, sustainable harvesting, and culinary preparation of wild edible plants represents an invaluable form of cultural heritage, intricately linked to local ecosystems and foodways (Dénes et al., 2012), thereby necessitating dedicated efforts towards its preservation, transmission to future generations, and sensitive integration into contemporary food systems.

3.2 Design Research Applications

The integration of edible wild plants presents new frontiers for design research. Food design and urban agriculture can utilize wild species to diversify edible landscapes, from rooftop gardens to public foraging zones. For example, design practitioners can collaborate with ecologists to create edible trails or school gardens that include native wild plants, blending ecological education with food justice goals.

Furthermore, incorporating wild plants into culinary education can elevate their cultural

and gastronomic status. Design-led interventions such as community-based workshops, recipe co-creation, and multimedia storytelling can help reframe perceptions of wild plants from "weeds" to valuable food resources. Such approaches also support ethical leadership by promoting inclusivity, local empowerment, and cultural preservation (Marelli et al., 2020; Dénes et al., 2012).

3.3 Ethical Considerations and Traditional Knowledge

Incorporating wild edible plants into modern food systems also raises crucial ethical considerations. First, the sustainable use of these plants must be rooted in the preservation of traditional ecological knowledge, often held by Indigenous and rural communities. Ethical leadership in food systems should prioritize the respectful inclusion of this knowledge while safeguarding community rights (Tahir et al., 2023; Maroyi, 2011). Second, harvesting and commercialization must adhere to responsible and transparent practices that avoid overexploitation. As some species may be slow-growing or endemic to specific regions, unregulated foraging could threaten biodiversity. Ethical frameworks must therefore include clear guidelines for sustainable harvesting, equitable benefit-sharing, and community-led conservation initiatives (Salvatore et al., 2020).

3.4 Challenges and Future Directions

Despite their promise, several barriers hinder the broader adoption of edible wild plants. One major challenge is public perception; many people associate wild plants with poverty or survival foods, which reduces their market appeal. Educational and design initiatives must therefore address these stigmas through positive framing and experiential learning.

Policy and regulatory gaps also impede progress. There is often little to no legal framework governing the collection, sale, or use of wild edible plants. Policymakers must work alongside researchers and communities to develop standards for sustainable harvesting, labeling, and food safety (Marchetti et al., 2020).

Commercial viability is another concern. While niche markets exist for wild foods, scaling these practices requires investment in value chains, processing infrastructure, and market access. Social enterprises and cooperatives can play a pivotal role here, particularly by empowering women and local communities who traditionally collect and use these plants (Maroyi, 2011).

Finally, more interdisciplinary research is needed to document species, assess their nutritional and ecological contributions, and evaluate their socio-economic impact. Such research should be participatory and inclusive, ensuring that the voices of traditional knowledge holders are central.

3.5 Overcoming Challenges and Fostering Sustainable Integration

Realizing the full potential of edible wild plants requires proactively addressing existing obstacles and strategically promoting their sustainable integration into mainstream food systems. A significant impediment to wider adoption lies in the prevailing lack of awareness and established knowledge surrounding the accurate identification of these plants, as well as the implementation of safe harvesting techniques and appropriate culinary preparation methods. Additionally, some wild edible plants may contain naturally occurring toxins or allergens that necessitate specific processing or cooking to render them safe for consumption. Overexploitation poses another potential threat, particularly for slow-growing or geographically restricted species, underscoring the critical importance of implementing sustainable harvesting practices that prioritize the long-term health and resilience of plant populations and their associated ecosystems.

In some regions, the use of wild plants for culinary purposes has been well-rooted, especially in the Mediterranean (Marelli et al., 2020). The island of Sicily, with its rich

ethnobotanical heritage, exemplifies a region where wild edible plants are not only integral to the local gastronomy but also contribute to the perceived well-being of its inhabitants. The natural and cultural inheritance of Sicily makes it wealthy and diversified for several reasons (Salvatore et al. 2020). Throughout Europe, a multitude of wild edible plants, often considered weeds, hold significant nutritional and culinary value. Dandelion serves as a prime example, showcasing the versatility of wild edibles with its leaves, flowers, and roots all being edible and suitable for distinct culinary applications. Similarly, the widespread common chickweed offers tender shoots and leaves that can be incorporated into salads or cooked as a leafy green.

Beyond Europe, diverse cultures worldwide have long embraced wild edible plants as integral components of their traditional diets and food systems. From the fertile landscapes of Southeast Asia to the arid regions of Africa and the Americas, a wealth of indigenous knowledge surrounds the identification, sustainable harvesting, and utilization of local wild plants for sustenance and medicinal purposes.

Successfully navigating these challenges necessitates a multifaceted approach encompassing comprehensive education and awareness campaigns, rigorous scientific research, the establishment of robust regulatory frameworks, and the active engagement of local communities. Targeted educational programs, leveraging diverse formats such as workshops, field guided walks, and digital resources, are essential to equip individuals with the ability to confidently and safely identify, harvest, and prepare edible wild plants, fostering a deeper understanding of their ecological significance and nutritional value. To provide consumers and producers with reliable guidance, detailed scientific investigations are essential to thoroughly assess the nutritional profiles, potential toxicities, and possible medicinal properties of various wild edible plants.

4. Conclusion

Edible wild plants, especially those often dismissed as weeds, offer a largely untapped yet highly promising resource for building more sustainable, ethical, and inclusive food systems. Their rich nutritional profiles, ecological resilience, and cultural significance make them vital assets in addressing climate change, biodiversity loss, and food insecurity—particularly for vulnerable populations (Nakano et al., 2024). These plants thrive in marginal environments without intensive inputs, diversify diets, and offer unique culinary potential, while their collection and processing can create crucial income-generating opportunities, especially for women and local communities (Maroyi, 2011). To fully harness their potential, we must adopt interdisciplinary and participatory approaches grounded in design research, ethical frameworks, and Indigenous knowledge. A coordinated effort among researchers, policymakers, educators, designers, and communities is essential to reintegrate these undervalued botanical treasures in ways that respect both people and the planet, ultimately fostering resilient ecosystems and human well-being.

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User Experience Design for BlockChain Technology based Application in Italian Logistics SMEs

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ABSTRACT | **This research explores how blockchain technology can be made more accessible and usable for small and medium-sized enterprises (SMEs) in the logistics sector, especially in Italy. While large global companies like Amazon and Walmart have already integrated blockchain into their operations, many smaller businesses struggle to adopt it. This is often due to complex infrastructure, limited digital skills, and a lack of user-friendly tools. Blockchain is a type of digital technology that allows for secure, transparent, and tamper-proof data sharing. One of its key features is the use of Smart Contracts—self-executing agreements that automate tasks and ensure that rules are followed without needing a central authority. In logistics, this could mean better tracking of shipments, more efficient processes, and stronger trust among partners. However, these technologies can be hard to understand and use—especially for workers who are not trained in digital tools. This project aims to bridge that gap by applying User Experience (UX) Design, a discipline that focuses on creating intuitive and human-centered tools. Through design thinking methods such as interviews, workshops, and prototype testing, the research will explore how blockchain can be adapted to the real needs of logistics workers. The approach is grounded in the idea that decentralized technologies, like blockchain, should be matched with decentralized design. Inspired by the economist Friedrich von Hayek's concept of "Spontaneous Order," the research views logistics systems as complex and evolving—best supported by flexible, bottom-up tools rather than rigid, top-down solutions. The research uses a "Research through Design" methodology, which means it develops theory and practical tools at the same time through real-world experimentation. A key part of the project is a collaboration with Speedy srl, a logistics SME based in Florence. By working directly with their staff—warehouse workers, dispatchers, and managers—the project tests how blockchain tools can be designed and improved based on real feedback and workplace challenges. Ultimately, the goal is to create a practical, user-friendly approach to implementing blockchain in logistics. This includes developing a toolbox of best practices and**

prototypes that can be reused by other companies. While the focus is on Italian SMEs, the outcomes of this research may help similar businesses in other countries adopt blockchain more smoothly, with workers—not just technology—at the center of innovation.

KEYWORDS | UX Design; Blockchain Technology; Systemic Design; Italian SMEs; Logistics

1. Introduction

Blockchain Technology (BCT), a structured form of Distributed Ledger Technology (DLT) that organizes data into sequential blocks secured through cryptographic mechanisms, is a highly versatile technology, enabling its application across various fields, including logistics. This technology can automate workflows through the implementation of Smart Contracts (SCs), self-executing programs based on BCT that automatically enforce agreements between parties, while simultaneously promoting data management and the decentralization of decision-making processes, enhancing transparency, security, and efficiency. In the logistics sector, BCT and SC can be used to improve Supply Chain traceability, streamline operations, and foster trust among stakeholders by providing an immutable and accessible record of transactions, thus revolutionizing traditional logistical processes.

Major global logistics corporations, such as Amazon and Walmart, have successfully implemented advanced technologies like BCT and SC into their workflows. However, in Italy, and particularly among Small and Medium-sized Enterprises (SMEs) in the logistics sector, technological transition is progressing more slowly and faces significant challenges in achieving seamless human-machine integration, mainly due to bureaucratic and infrastructural barriers (Bianchini & Kwon, 2020) (Figure 1).

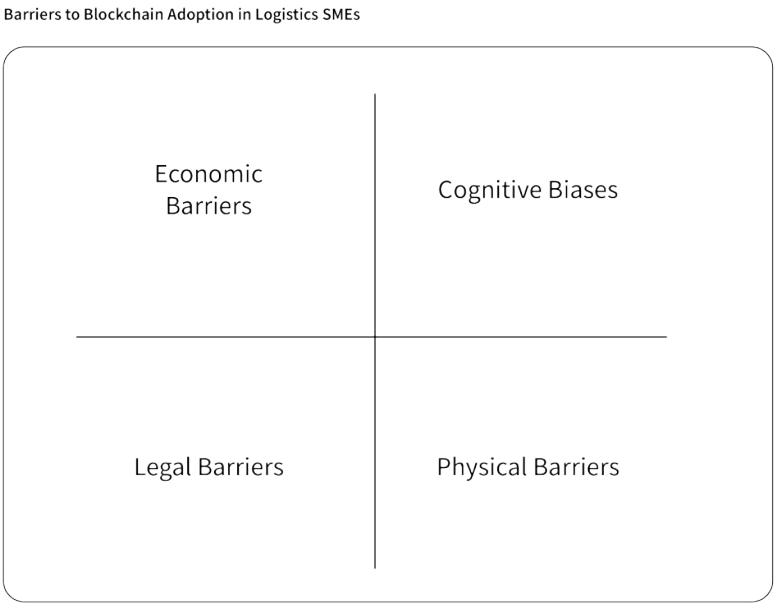

Figure 1. Barriers to BCT in Logistics SMEs (Loprieno, 2025)

A 2020 report by the OECD (Organisation for Economic Co-operation and Development) highlights opportunities and potential challenges related to the adoption of BCT within the Italian entrepreneurial landscape. Italian SMEs, which are highly active in international markets, accounting for nearly 40% of the country's total exports (equivalent to USD 153 billion out of a total of USD 379 billion in 2017), could represent a significant avenue for the development of DLT based solutions (Bianchini & Kwon, 2020).

The present research aims to investigate, through the lens of User Experience (UX) Design, the most effective applications and interfaces for a blockchain-based logistics workflow. UX Design methodologies are particularly well-suited for integrating BCT into the logistics framework, either by offering tailored solutions for specific use cases or serving as a versatile toolbox for businesses (Chen et al., 2022). The objective is to ensure that BCT is not only accessible but also effectively integrated with the existing expertise of workers in the logistics sector, fostering a smooth transition and maximizing its practical applicability.

2. Scientific Framework

Before applying BCT to logistics, we explore its potential as a model for decentralized design, establishing the theoretical basis for developing worker-centered solutions tailored to Italian SMEs (Figure 2).

BCT enables a decentralized system based on transparency and efficient peer-to-peer interactions. Friedrich von Hayek, a prominent figure in evolutionary economics and sociology, emphasized the concept of "Spontaneous Order," whereby complex economic systems emerge organically from individual actions, rather than from centralized planning. He argued that this system is a result of human actions but not of human design, highlighting the limitations of top-down control in economic affairs (Von Hayek's Legacy of the Spontaneous Order | Federal Reserve Bank of Minneapolis, s.d.). Therefore, this perspective aligns with the decentralized nature of BCT, which operates without a central authority, relying on a distributed network of participants to validate and record transactions. This decentralized mechanism mirrors von Hayek's idea of "Spontaneous Order", as it allows for the emergence of trust and coordination among parties without centralized oversight.

The nature of decentralization in BCT could have other possible applications besides the rearrangement of control and power in the Supply Chain. By incorporating this aspect into design, decentralization can be seen as co-designing systems that actively encourage user participation. At the center of the discussion on new technologies and Industry 5.0, the human-centered aspect is crucial for promoting technological change that better serves the needs of workers, enhancing their productivity and efficiency.

The principles and processes of Design Thinking (DT), a discipline increasingly adopted in business innovation, are key to providing human-centered solutions that support the digital transition of Italian logistics SMEs towards BCT-based applications. Therefore, emphasizing the importance of involving stakeholders and workers in decisions-making processes is crucial to develop solutions that meet their needs and promote innovation (Saldivar et al., 2023).

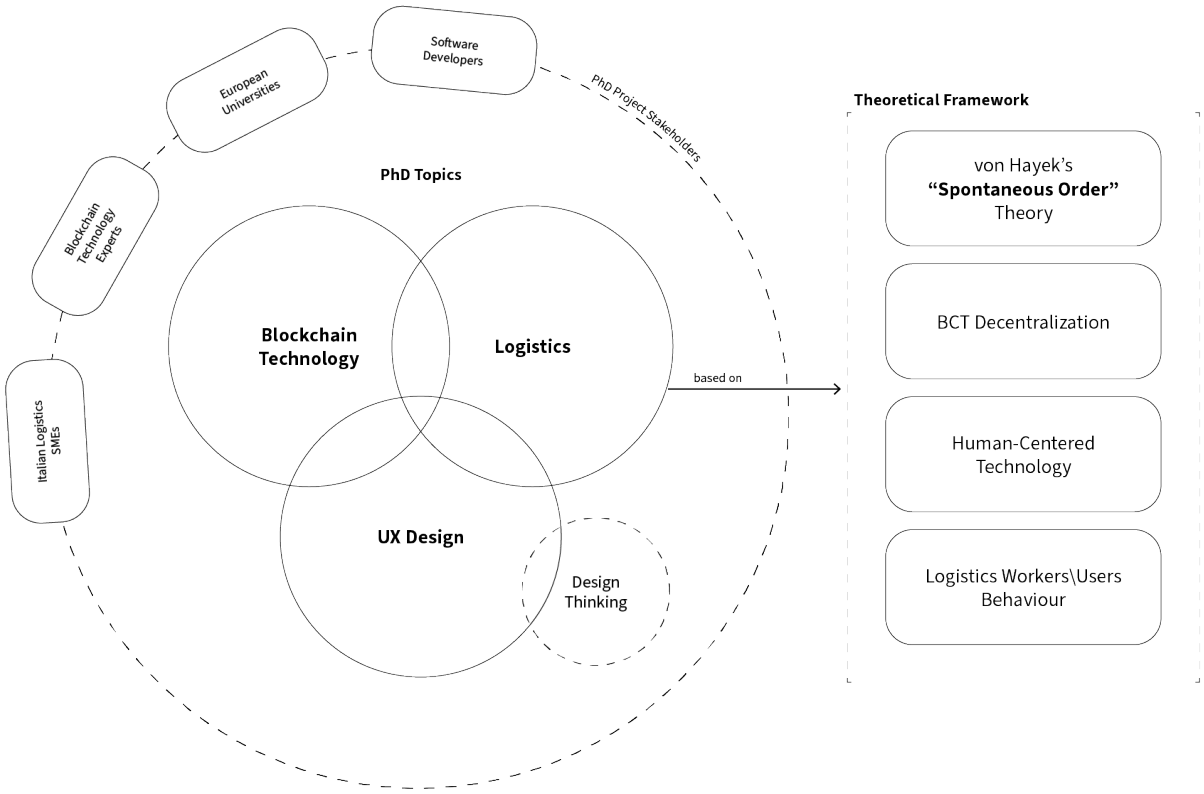

Figure 2. PhD Topics (Loprieno, 2025)

Based on DT principles and the centrality of the human, it is possible to identify a discipline that, more than others, channels this focus: UX Design. UX Design is a holistic discipline widely used in Product Research and Development, both for physical and digital products, based on the observation of final users behavioural patterns. In order to study user behaviour, the most common methodologies are rooted in Ethnographic Research to provide qualitative data. Participant observation and semi-structured interviews can lead to meaningful insights on what logistics workers and SMEs need.

Researchers from the Netherlands and Scotland proposed GeoPact, a geolocation system developed to enhance the services of local logistics companies using DLT, Internet of Things (IoT), and SC. GeoPact enables location-aware SCs, offering adaptable and sustainable logistics solutions. By engaging participants in courier roleplays governed by SCs, the project connects complex technological infrastructure to relatable activities, fostering public input, reflection, and greater accessibility (Tallyn et al., 2020).

With this study, the authors make an effort to demystify BCT and make it more intuitive and accessible to the wider public, and to accentuate its great, yet relatively untapped, potential in logistics.

3. Blockchain UX challenges for Logistic Workers

One of the main challenges of this project, from a UX Design point of view, is to develop an intuitive system that enables a seamless work experience while simplifying and concealing the complexity of the underlying BCT (Figure 3) . A well-designed User Interface (UI) and UX Design can effectively guide and educate workers, empowering them to fully leverage the benefits of BCT to achieve their objectives in an efficient, effective, and satisfying manner (Chen et al., 2022).

The development of these tools, particularly from a UX Design perspective, must prioritize the needs and existing skillsets of logistics workers. This requires more intuitive and "natural" interfaces that prioritize the needs of workers to foster seamless adaptation between them and the technology. The design process should focus on creating an Information Architecture that aligns with the real-world needs of users, ensuring the interface is tailored to their workflows and requirements.

Implementing BCT in the logistics sector requires a collaborative approach, with both business owners and software providers playing pivotal roles. A key consideration is whether the software provider dictates the workflow or if the company develops its own software and technology. Currently, there are instances where software providers act as distributors and service providers for blockchain and SCs. Conversely, larger companies often develop proprietary software and technologies for their employees and stakeholders, streamlining processes. The most desirable solution is to foster synergy between tool providers and service users, taking into account the needs of the company and its workers, thereby placing technology at the service of people.

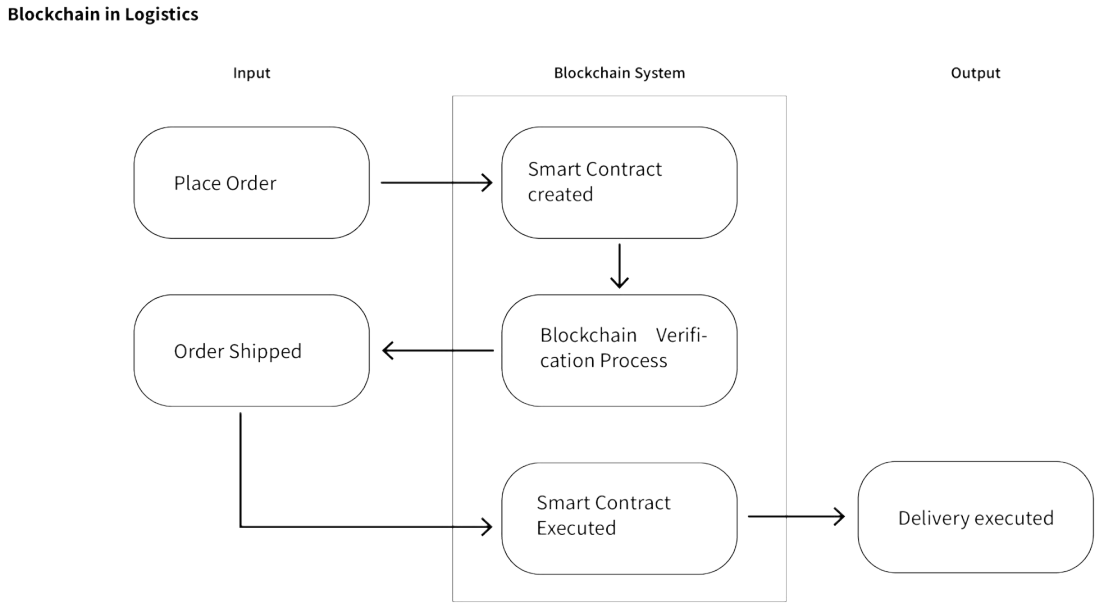

Figure 3. BCT in Logistics (Loprieno, 2025)

4. Research Questions

In particular, the research questions driving the study are the following:

- **RQ1:** How can the challenges faced by designers when integrating BCT into logistics SMEs be identified and systematically organized?
- **RQ2:** What information architecture can ensure that BCT is accessible, easy to understand, and user-friendly for workers in the logistics sector?
- **RQ3:** How can the existing skills of logistics workers be effectively harnessed to facilitate the adoption of BCT?

5. Methodology and Phases

The PhD research employs the Research through Design (RtD) approach as its primary methodology, since it enables an iterative, practice-based exploration of BCT applications within logistics SMEs. This approach fosters an ongoing dialogue between theory and practice, allowing for the co-evolution of design solutions and conceptual insights. To ensure the methodology is aligned with the specific needs of the logistics company co-funding the project, an additional tailored methodological framework will be identified during the research process. This framework will be developed through continuous engagement with industry stakeholders, ensuring that the research remains responsive to real-world challenges and opportunities.

The project is structured into 3 key phases (Fig. 4):

- Foundational Research and Benchmarking;
- Co-Design and Data Collection;
- Prototyping and Iterative Testing.

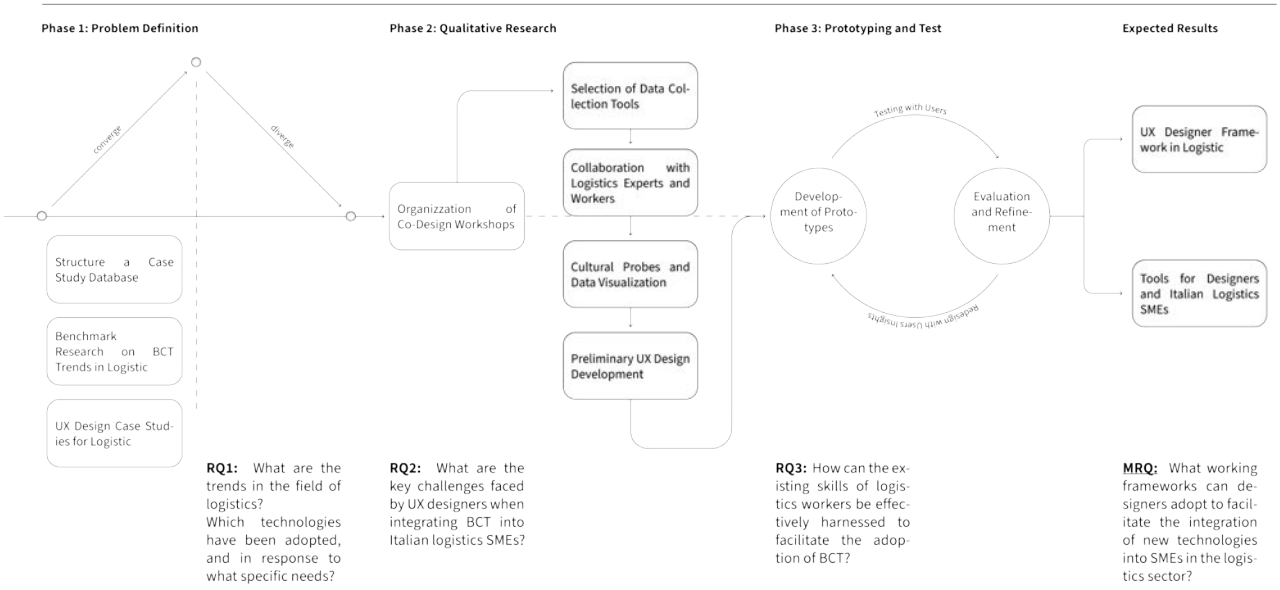

Figure 4. Phases and Methology (Loprieno, 2025)

To better illustrate the methodology and highlight the interrelationship between methods, a visual representation of the research process will be developed (Figure 5). This process map will connect key UX and DT methods—such as co-design workshops, cultural probes, and iterative prototyping—showing how they are integrated throughout the research phases. This diagram will also clarify how user input is gathered, interpreted, and translated into actionable design outcomes. Furthermore, detailed documentation of at least two case studies will be provided to concretely show how these methods were applied in real-world logistics scenarios, offering insight into the practicalities and challenges of UX design in blockchain implementations.

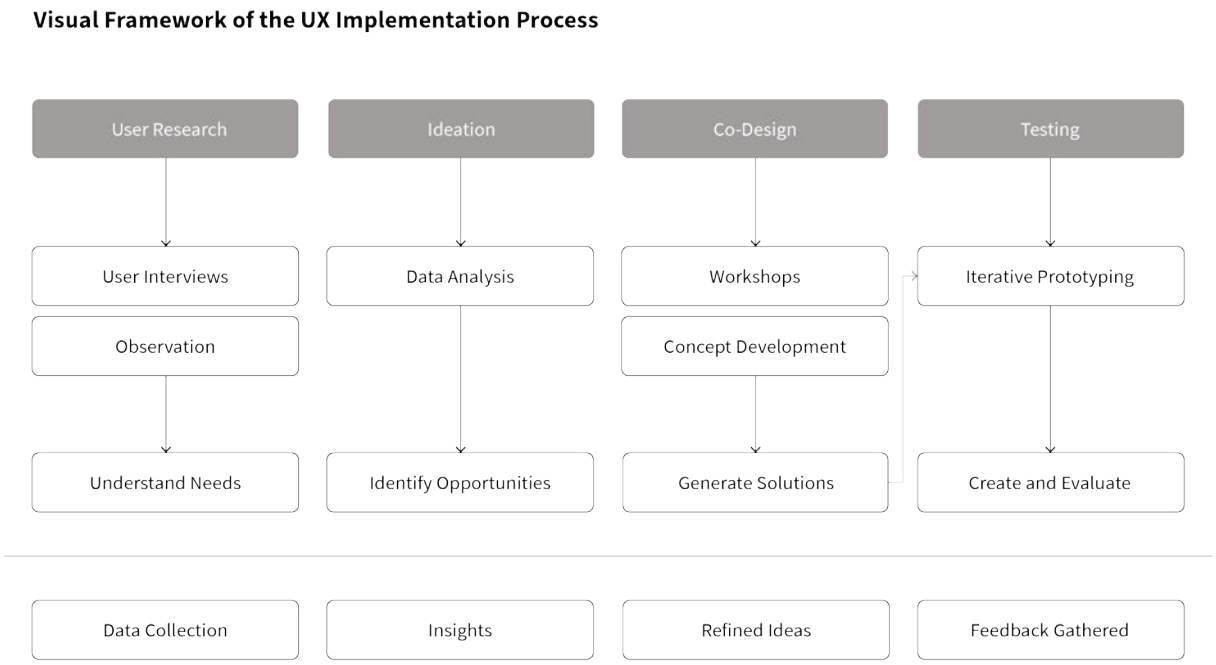

Figure 5. Visual Framework of UX Implementation Process (Loprieno, 2025)

To provide a clearer understanding of the methodological flow, a visual framework will be created to map the integration of UX design tools throughout the project. This will include stages of user research, ideation, co-design, prototyping, and testing. Each phase will be annotated with the corresponding activities and their objectives, as well as the data collected and how it feeds into subsequent steps. This graphical representation will help bridge the gap between abstract methodology and practical implementation, highlighting the cyclical and participatory nature of the RtD approach.

To ground this methodology in a real-world scenario, the research includes an ongoing case study involving Speedy srl, a mid-sized logistics SME based in Florence, Italy. Operating in freight and last-mile delivery, Speedy reflects the typical digital challenges of Italian SMEs: fragmented infrastructure, limited blockchain literacy, and constrained innovation resources. As the industrial partner supporting this research, Speedy offers access to live logistics settings where user research can be conducted. Ethnographic methods such as field observations and interviews have been carried out with warehouse staff, dispatchers, and managers to explore pain points and workflows. These findings informed the design of low-fidelity blockchain-enabled tools, later tested in co-design workshops focused on Smart Contract interfaces and usability. This collaboration provides a concrete testing ground for evaluating how blockchain tools can be made usable and accessible for non-technical users. The Speedy case study thus supports the broader goal of this research: to develop a UX-based methodology that fosters the adoption of blockchain systems within small, decentralized logistics contexts.

6. Conclusions and Outlook

In conclusion, this research aims to support the integration of UX Design and Research within Italian SMEs in the logistics sector, emphasizing the role of user-centered design methodologies in the adoption of BCT-based applications.

The immediate next step is the creation of a case study database, to build a theoretical and practical basis from which the remainder of the project may stem. Next, the research will focus on benchmarking BCT-based applications to provide an up-to-date overview of this rapidly evolving field. Through the initial literature review, two project gaps have been identified that will guide the next phases of investigation. These include: exploring how decentralized design approaches can foster new disciplinary perspectives within design practice and investigating how user-centered methodologies can be adapted to make BCT applications more accessible and intuitive for non-expert users, particularly within the operational contexts of Italian logistics SMEs.

This preparation will allow us to focus on Italian logistics SMEs, organizing workshops and collaborating with multiple interested partners in order to build a toolbox of “good practices” which we will then apply to build a first prototype of the thesis project.

The research outputs from this PhD project will hopefully pave the way for a wider and more straightforward application of BCT technology in Italian SMEs. We believe that our work towards this goal will naturally generate ideas and strategies for the application of BCT in other areas which could greatly benefit from it, and we will strive for generality in the creation of our toolbox.

In particular, the detailed case studies will not only provide evidence of the research's relevance and feasibility but will also act as examples for future applications. These cases will document the UX methods used, the feedback from logistics workers, and the resulting prototypes. By visually mapping the process and documenting outcomes, the research aims to offer a replicable model for decentralizing design within logistics SMEs.

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What if Service Design meets Deep Ecology? Implications on Ecosystemic Services Opportunities in Urban Systems

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ABSTRACT
The latest research is exploring the connection between service design and systemic approaches to addressing contemporary urban challenges. In particular, systems thinking inspired by deep ecology (Session & Devall, 1985; Naess, 1988) provides a critical lens for analyzing transition processes, helping to define priorities, identify areas of intervention, and develop more effective solutions through an incremental evolution oriented toward change. The design of ecosystemic services (ES) represents a strategy for making urban services more sustainable and inclusive, emphasizing participatory processes and an interconnected vision of systems (Villari, 2022). This approach seeks to rebalance the relationship between human-altered environments and the social and environmental impacts they produce. It shifts the focus of service design beyond the creation of isolated solutions, fostering structural and lasting changes within service systems (Vink et al., 2020). The integration of systemic and ecosystemic perspectives into service design can also provide more effective tools for addressing complexity and future uncertainty, supporting a progressive and informed adaptation to emerging challenges (Lin & Villari, 2023). Ecosystemic services embody the challenge for design to promote well-being and social justice without compromising natural resources and environmental contexts (Alexander et al., 2016). This research highlights the intersections between *service design* and *deep ecological thinking*, aiming to contribute to the development of methodological approaches that foster solutions capable of generating radical change. This is particularly relevant in light of the widespread tendency to rely on empty or oversimplified narratives, which often undermine the impact of concrete action. This study further explores specific

points of convergence between deep ecology and design cultures. The first reflection focuses on Institutional Learning as an example of the autopoietic behavior of socio-technical systems. The second examines the conceptualization of the Three Pillars Model of sustainability, arguing for its reconsideration due to the hierarchical relationships between economic, social, and environmental spheres. This reconsideration aligns with the principles of deep ecology, as it places the environment as the foundation of socio-economic systems rather than treating them as equals. These two in-depth analyses serve to exemplify the alignment between the opportunities for developing ES and the characteristics of systems thinking (Capra & Luisi, 2013), which should be understood as a guiding framework for design cultures oriented toward social and environmental justice.

This paper contributes to the current discourse on systemic and sustainable design by proposing a novel integration of Deep Ecology principles into Service Design methodologies. Through the dual analytical focus on Institutional Learning as autopoietic behaviour of social systems (SS), and the reframing of the sustainability paradigm from intersecting to nested systems, it offers a renewed conceptual and methodological lens for designing ES that respond to complex socio-environmental challenges in urban contexts.

KEYWORDS
Service Design, Deep Ecology, Ecosystemic Services, Urban Sustainability, Systemic Thinking

Abbreviations:
(SS) Social System/s
(SI) Social Innovation
(ES) Ecosystemic Services

1. Research Framework

The relationship between Design and Nature cannot be reduced to the historical dichotomy between anthropized contexts and natural systems. Consistent with a systemic and ecosystemic view of the relationship between nature and anthropization, it is no longer sufficient to consider the human-centered perspective as external to natural systems. Since humans are seen within the systemic perspective as integral parts and agents of nature, systemic approaches directs its action and research with the awareness that human beings and the objects of their actions in the world are not external entities to nature, but rather part of it, while simultaneously contaminating and conditioning it.

> "In modernity's Anthropocene, the loss of earth is coupled with the loss of the diversity of relational worlds. The distinction between 'earth' and 'worlds' is crucial. While 'worlds' are anthropological social and historical realities, 'earth' names our living planet, the grounding precedence of every world." (Vazquez, 2017: 79)

Aware of being part of the planetary system from which we extract resources and upon which we impose the consequences of our actions, within Design Cultures it is increasingly crucial to critically rethink design models and develop tools capable of addressing environmental crises in a systemic and responsible manner. In particular, the effects of Climate Change become especially evident in urban contexts. The density of both human populations and architectural structures is a primary factor in resource depletion (food, energy, social, etc.), as well as a direct contributor to climate impacts. In tackling the challenges posed by these increasingly severe crises, the design of ES emerges as a strategy aimed at simultaneously improving social well-being and climatic conditions. Scientific research has made it increasingly clear that many of today's major wicked problems (Buchanan, 1992) are now inevitable and inherently unsolvable in a definitive manner. This awareness requires design not only to acknowledge complexity as a fundamental premise of the discipline but also to accept the continuous emergence of new crises as an ontological condition of the field. Within this scenario, design must evolve by adopting a flexible and adaptive approach, capable of addressing complex systems and emerging crises as structural elements of its scope of action.

> "On one hand, climate change drives the search for information to build forecasts and simulations of future scenarios that can guide decision-making. On the other hand, it necessitates the acceptance of a heightened level of uncertainty, urging us to envision and embrace a state of 'constructive instability' from the early stages of planning and ideation to its impacts on the territory." (Manigrasso, 2022: 348 - free translation from Italian)

Precisely due to the unpredictability and uncertainty of disasters, crises, and catastrophes, Lakoff (2007, 2017) refers to preparedness as a mature attitude aimed at creating the conditions for making both present and future emergencies as manageable as possible. Within this framework of challenges posed by climate change and environmental and social crisis, there are two main approaches to preventing impacts: acting on its causes through *mitigation measures*, and acting on its effects through *adaptation strategies* (Gianfrate & Longo, 2017: 45). Both of these approaches influence the designing of strategies based on ES (Heal, 2000; Lele et al., 2013). *Ecosystem services*, defined as "the benefits people obtain from ecosystems," representing the full range of social, ecological, and economic benefits that people derive from nature, according with four clusters: *provisioning services*, *regulating services*, *cultural services* and *supporting services* (Millennium Ecosystem Assessment, 2005a). While the concept has catalyzed significant research, it also risks oversimplifying the complex relationships between nature and society, potentially obscuring critical ecological and cultural dynamics (Lele et al., 2013). Its widespread appeal is also due to its function as a *boundary object,* adaptable to different disciplinary languages and agendas, generating tensions and misunderstandings in practical applications (Kull et al., 2015). Moreover, a persistent lack of interdisciplinarity in policy and empirical studies continues to hinder the effectiveness and transformative potential of ecosystem service-based interventions (Seppelt et al., 2011).

From this perspective, the designing of ES sets the study of the relationships between the parts of systems, and the structural effects that changes generate on the system and between systems, as a design condition. The methodological culture of *Systemic Design*[i] is based precisely on the relational nature of its action, within and between systems.

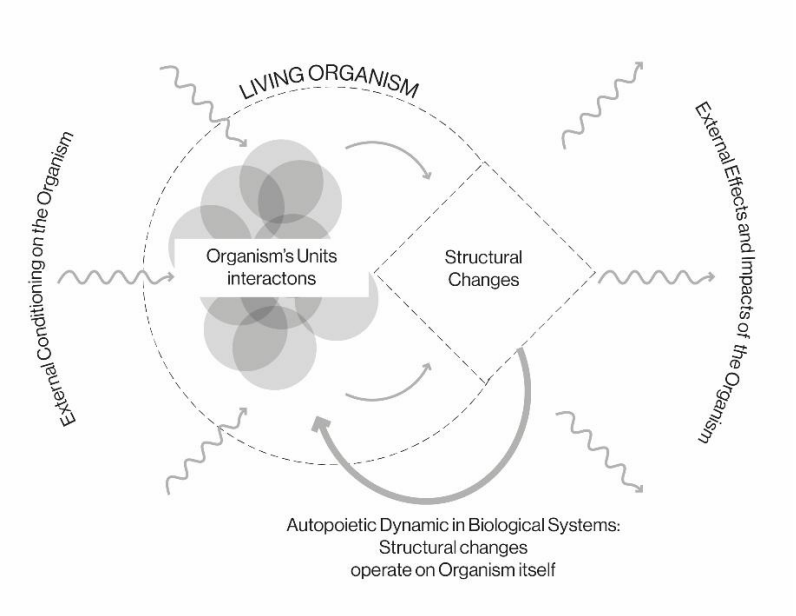
The intrinsically ecological nature of both systemic design and ES is twofold: on one hand, it approaches the analysis of contexts and design in ecological terms, meaning in terms of interdependent and co determining relationships; on the other hand, it is ecological because it assumes as its ontology the fact that humans are constituent units of natural systems, not external agents to them. Devall and Sessions distinguished between a 'shallow' ecology, centered on humans with anthropocentric perspective, and a 'deep' ecology (Devall and Sessions, 1985), which "does not separate humans – or anything else – from the natural environment and sees the world not as a collection of isolated objects but as a network of fundamentally interconnected and interdependent phenomena." (Capra and Luisi, 2014 – p. 31 free translation from Italian).

This awareness serves as an important starting point for a broader research framework exploring the intersections between *design*, *ecosystemic services*, *ecological thinking*, and *philosophical holism*. Just as contemporary design processes and cultural approaches recognize collaboration and transdisciplinarity as generative conditions, intersectionality (Tironi, Albornoz, & Chilet, 2022) characterizes the struggles for social and environmental justice within our societies (capable to influences institutions), highlighting the deep connection between cooperation and impact capacity. This perspective invites reflection on the need to forge new alliances and synergies across different fields of research and design, situating this discussion within the broader debate on the decolonization of design thinking and *post-anthropocentric design*[ii].

2. Convergences: bringing Deep Ecology in Design approaches

2.1. Social Systems, Autopoiesis and the example of Institutional Learning

Systems thinking gained increased relevance as scholars began to emphasize the dynamic interdependence between micro-level interactions and macro-level structures, highlighting their mutual influence in processes of complex coevolution and self-organization (Lundvall, 2007). In systems studies, the aspect of interdependence and mutual conditioning between units and the system – thus between humans and nature too – was introduced by the Santiago School with the term autopoiesis (Varela and Maturana, 1980/1973). Autopoiesis describes, starting from biological analysis, how systemic units of an organism are not only in relation to each other within a given system. It is precisely the relationship between the internal units of the system that generates interference and conditioning on the system, in a no-ending cycle that generates continuous forms of mutual learning between the system as a conditioning and regulating context and its interconnected units, in turn generators of altering impacts on the system as a whole [figure 01/a]. However, it is the analogy between micro and macro levels on which all systemic thinking is based that allows us to identify this type of relationship on different scales. If we start from the urban context as an analytical and practical field, we can recognize that it is also a SS within which dynamics between subjects, relationships and practices lead to an impact on the social system itself. this is the case of the relationship between SI practices and forms of Institutional Learning. [figure 01/b]



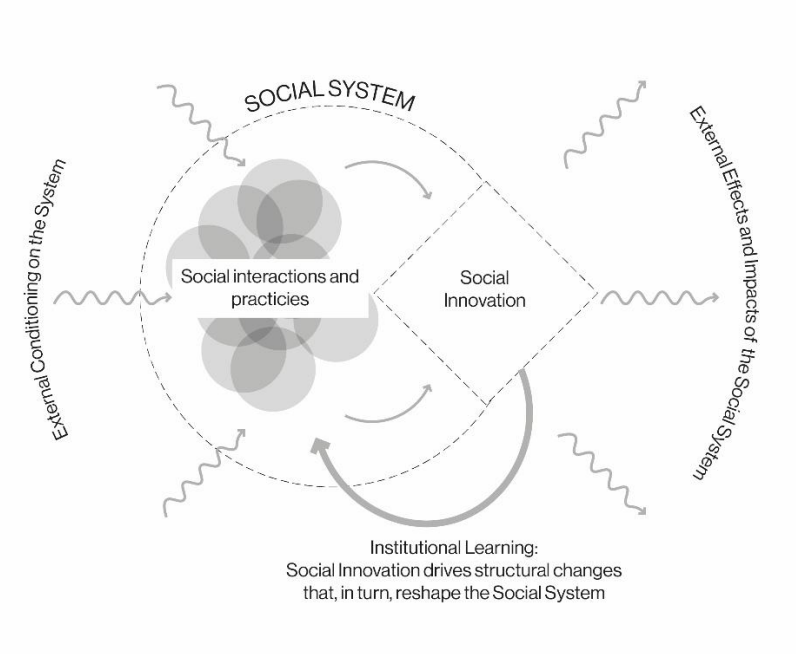


Figure 01a / 01b

Autopoietic dynamics in Systems - Analogy between autopoiesis dynamic in organisms (01a) and institutional Learning dynamic in SS (01b) (Personal elaboration)

Practices of SI rise to continuous reconfigurations of physical spaces, relational infrastructures and social imaginaries that SS produce and feed. From this perspective, ES can offer an innovative opportunity not only for the management and distribution of natural resources, but also and above all for the conception of their use in compliance with the natural systems to which SS belong, according with the deep ecology hierarchy of priorities in ecosystems: environmental, than social, and finally economical. According to Capra and Luisi, for autopoiesis,

> "a living system is coupled with its environment in a structural way, that is, through recurrent interactions, each of which triggers structural changes in

> the system. Nevertheless, living systems are autonomous. The environment merely triggers structural changes but neither specifies nor directs them" (Capra and Luisi, 2014 – p. 323 free translation from Italian).

The success of this insight within systemic thinking in Design is that biological systems can be interchanged with other types of systems, while maintaining the conditioning structural relationship between the parts and the whole. For instance, there is a profound analogy between autopoiesis in biology and what Ezio Manzini defines as 'Politics of the Everyday.':

> "The expression 'Politics of the Everyday' indicates a sequence of actions that influence the sociotechnical systems (and therefore also economic, political, and cultural) in which one operates and with which one interacts: actions on the world, related to everyday life, carried out from where one is, that is, from one's own point of observation and action. In other words: a politics of the everyday is the systemic effect of a life project" (Manzini, 2018 - free translation from Italian). [figure 02]

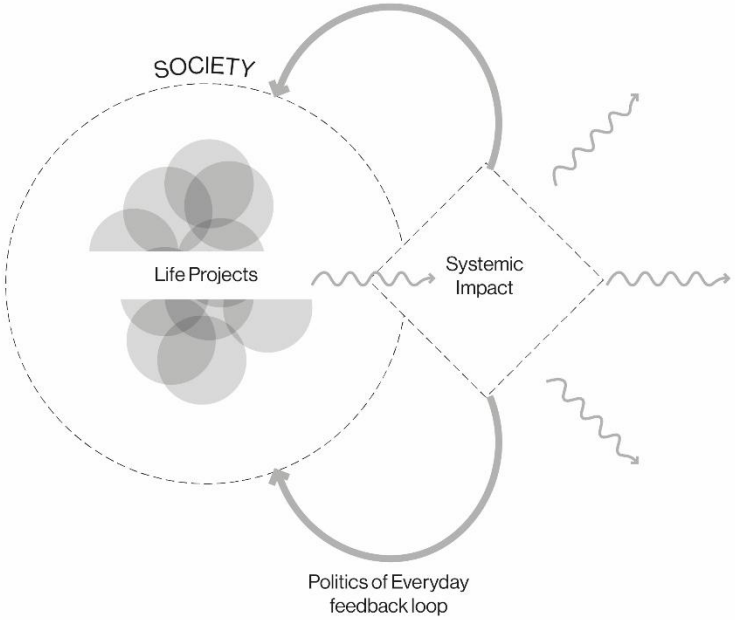


Figure 2.

How Life Projects generates Systemic Impact according with the Manzini's idea of 'Politics of everyday'. (Personal elaboration of Manzini 'politics of everyday' concept)

The relationships between system units and the system as a whole define the autopoietic dynamics, which can be found in both SS and biological systems. Social innovation (SI) is widely recognized in research as a fundamental driver for advancing social justice (Joel & Nel-Sanders, 2021) and facilitating climate transition processes (Bresciani, Rizzo & Deserti, 2022). For this reason, the literature on SI acknowledges its potential as a strategic direction for influencing both behavioral and cognitive changes at the individual level (units of systems) and for reconfiguring and reorganizing socio-technical systems (entire systems) (Bresciani et al., 2022).

An example of the autopoietic behavior of SS is, for instance, Institutional Learning (Stein, 1997; Watts et al., 2007). This refers to the ability of technical, political, and legal systems to adapt to the evolution of society. This can happen mainly in two ways: the anticipation of future directions and emerging needs, both in social organization and in the management of resources and opportunities by those who hold governance; or through a deductive process of producing change. In the second case, it involves exactly what systemic thinking describes as autopoiesis. When behaviors, expectations, and social desires lead to forms of SI, the political-administrative system, recognizing the strategic value of these innovative practices, mobilizes to create the conditions for these change-oriented behaviors to become structural. In this case, Institutional Learning follows an incremental logic and dynamic, leading from initial experiments on a medium-small scale to complex processes aimed at producing and sustaining structural changes (Watts et al., 2007). This type of learning is driven by SI, but at the same time, it adopts SI strategies to fuel change. In this case, SI takes shape through cooperative and collaborative dynamics of relational networks (Ziegler, 2017).

> "[…] At the collaborative levels, the characteristics of networks (both physical and immaterial) become very important for the design dimension. They therefore serve as support for the circulation of knowledge and are necessary mechanisms to initiate and sustain processes of territorial development. As such, they represent resources available for the design activity." (Villari, 2012: 34 – free translation from Italian)

Finally, due to the recognition of complexity as an ontological condition of systems, institutional learning cannot overlook or evade the tensions and conflicts that run through society and urban phenomena (Ostanel, 2023). For this reason, institutional adaptation and learning processes cannot ignore the inequalities and emerging challenges, but are expected to acknowledge and support the value of SI practices that arise from the grassroots and informality, and which over time are capable of spreading new sensibilities, guiding change and transition processes towards fairer and more sustainable societies, following an autopoietic dynamic. In this case, *Institutional Learning* aligns with what Manzini describes as the *Politics of the Everyday*: the sum of different life projects guides the reorganization of social structures in order to produce a structural, systemic change. At the same time, the system changes to generate and distribute benefits within itself. Institutional learning can be understood as the capacity of social systems to structurally incorporate improvements emerging from forms of social innovation; than, *Institutional Learning*, when viewed through the lens of systemic thinking, is an example of an autopoietic process.

Precisely with regard to the debate around ES, moving from conceptual frameworks to operational implementation requires radical change, including learning organizations, adaptive governance, stakeholder engagement, and user-driven research, within an integrated and systemic approach that goes beyond sectoral conservation and addresses the complex social, ecological, and economic interdependencies involved: "Radical transformations will be required to move from conceptual frameworks and theory to practical integration of ES into decision-making, in a way that is credible, replicable, scalable, and sustainable" (Daily & Matson, 2008, p. 9456).

2.2 Hierarchies and priorities in sustainable ecosystems

Despite the inflating forces that absorb sustainability rhetoric, leading in some cases to a partial dilution of its meaning in common discourse, sustainability remains one of the main fields of investigation and action in research. The 'Three Pillar Diagram' visualization commonly used to represent the idea of sustainability (Fig. 3) as the balance between the environmental, social, and economic dimensions is challenged by the notion of 'deep ecology.' The idea of 'deep ecology,' since it reconceptualizes the human dimension (thus social and economic) as an integral unit of the natural world within a systemic perspective, raises a hierarchy issue that will influence systemic design thinking and action. The Three Pillar Diagram with intersecting spheres tends to be replaced by a logical/conceptual model of concentric spheres. In their recent work, Vezzoli, Macrì, Takacs, and Yang (2022) reaffirm the vision of the three interlinked dimensions:

> "It is common to schematize sustainability with three interlinked dimensions (United Nations, 2015): Environmental protection […], Social equity and inclusion […], Economic prosperity […]" (Vezzoli et al., 2022 – p. 16)

While the framing of environmental, social, and economic sustainability concepts is correct, it is the idea of parity between the dimensions that is challenged by the deep ecology vision. For instance, with the reflection on Systemic Innovation, Midgley and Lindhult (2021) acknowledge the nested nature of sustainability orders:

> "[…] an innovation is 'systemic' when its purpose is to change societal laws and norms to place new enablers and constraints on innovation in the interests of ecological sustainability. What makes this systemic is the acknowledgment of the existence of nested systems: innovation systems are parts of economic systems, which are parts of societal systems, and all societies exist on a single planetary ecosystem" (Midgley & Lindhult, 2021: 635).

They assert that what makes a reflection systemic is precisely the ability to recognize that the various systems have in common—and must ultimately account for—the belonging to a single planetary ecosystem. In this direction, also Osti (2013) give us a perspective on urban contexts according with a hierarchical envisioning of sustainability challenges:

> "Let's immediately clear the field of the widespread practice of dividing sustainability into three areas— social, economic, and environmental—and representing it with three partially overlapping circles. This representation is misleading because it aligns three phenomena that are too different and ends up neglecting the relationships between them, which are by far the real issue. Instead, three concentric circles are preferred, where the largest represents the environment, the intermediate one represents society, and the innermost one represents the economy. It is the natural environment, or rather the entire world, that physically contains and allows for the survival of human beings aggregated in

societies, who in turn perform specific productive and distributive activities (economy)." (Osti, 2013, p. 68 – free translation from Italian).

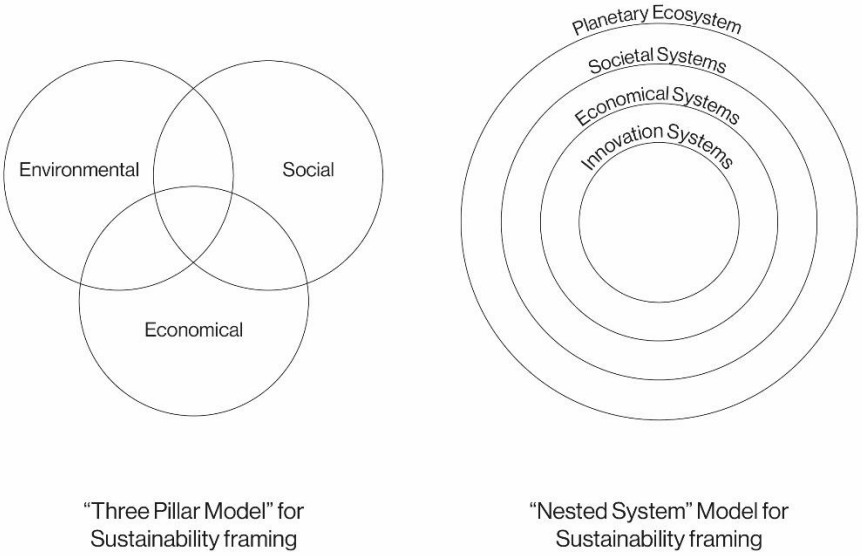


Figure 3.
Comparison of Sustainability framing (Personal elaboration)

This common coexistence, which places all beings in relation to planetary life, has also been discussed by authors from other disciplines who have nevertheless influenced systemic thinking to some extent. For example, landscape architect Gilles Clément spoke of the Planetary Garden to describe Earth as a unique and global garden, requiring sustainable and conscious management to preserve biodiversity and ecological balance (Clément, 2004). Already in 1974, Lovelock identified self-regulation as the key to the balance of planets and astrophysical systems (Capra & Luisi, 2014). His idea marked a departure from conventional science, which considered Earth as a body composed of inanimate natural elements. Lovelock's proposal was to consider Earth as a complex system "comprising all aspects of life and its environment, so closely linked as to form a self regulating entity" (Lovelock, 1991: 12). This formulation followed reflections on feedback loops as drivers of the self-regulation of complex systems. What in Systemic approaches corresponds to the idea of Feedback loops, iterative processes and Assessment mechanisms equates to the intuition and demonstration of the complex network of feedback loops determining the self-regulation of the planetary system (Lovelock & Margulis, 1974).

Although systems thinking has historically developed from the recognition of a hierarchy among systems – commonly referred to as Systems Hierarchy (Midgley & Lindhult, 2021: 642) – it is still common, even within design approaches explicitly informed by ecological awareness, to treat the three dimensions of sustainability (environmental, social, and economic) as

equivalent domains, overlooking their nested and interdependent structure. We can therefore distinguish between approaches based on the equivalence of systems (characteristic of shallow ecology / Three Pillar Model) and those that consciously acknowledge the nested and hierarchical nature of the systems within which change is pursued, in alignment with the deep ecology perspective.

3. Ecosystemic Services and System Thinking: future challenges

Although widely explored in the scientific literature, the convergence between Systemic Thinking and Design Cultures still has significant room for development in the construction of methodologies and practical application. This brief compendium, only briefly outlined here, represents a further field of theoretical and methodological exploration for the conception and operational translation of ES as a mitigation and adaptation solution to the *cyclical* and *nested crises* (Mohandesi, 2020) shaping the present.

This research aims to contribute to enhancing and strengthening the radical nature of ecological thinking within the transformation and transition processes that our society is called to face. In this context, the 'characteristics of systemic thinking' (Capra & Luisi, 2013: 107-111) represent, for example, an opportunity to develop and experiment with innovative practices in urban contexts, providing, rather than principles, actual logical and methodological frameworks for conceiving and developing projects.

In essence, the paper argues for institutional learning from everyday practices and for recognizing the nested hierarchy of systems as a way to foster deeper and faster ecological transitions.

The fields of design application can strengthen the regenerative credibility of the discipline, provided that the perspective of 'quality of complexity' (Tassinari & Manzini, 2023) is capable of triggering changes both at the individual and social level, and therefore systemic, in a truly autopoietic relationship. Preserving the radical nature of the principles underlying ecological thinking, is today one of the main challenges of processes that aim to promote change. However, this objective must be pursued while avoiding the risk of diluting these principles into vague and indistinct rhetoric. In fact, the abuse of certain rhetorical discourses, invoked in both public and academic debates as umbrella-concepts (Massari & Orioli, 2023), is responsible for the partial loss of credibility of certain practices. When empty and sweetened discourses (Marchigiani & Bonfantini, 2022) are repeated redundantly, without genuine critical awareness, their impact diminishes, as does their ability to affect imaginaries and generate convergences and behavioral changes in society, sometimes compromising the possibility of promoting truly radical changes. For this reason, the development of ES can represent a significant opportunity when there is a genuine orientation toward radical and systemic change. On the contrary, it risks becoming a waste of resources and little more than a cosmetic operation if used merely as a rhetorical tool to perpetuate inertia and boast about change, without generating structural, effective, and long-lasting transformations.

*Some portions of this text were translated using machine translation tools, including AI-based software. The content

was subsequently reviewed and edited by the author to ensure scientific accuracy and consistency.

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[i] Particularly relevant from this perspective is the research work carried out on Systemic Design, in particular the contributions of several authors belonging to the research areas of System Oriented Design (SOD) and Relating Systems Thinking and Design (RSD). Among the main contributors to the application of systemic thinking in design cultures are Birgit Sevaldson (2014, 2019), Peter Jones (2014, 2022), Richard Buchanan (1992, 2019) Bela H. Banathy (2009, 2013), et al.

[ii] See in this regard the work of Arturo Escobar (2011, 2018, 2020), Tony Fry (2009, 2017, 2020), Rolando Vázquez (2012, 2017), Madina Tsolonova (2017), Martin Tironi (2022, 2022, 2023), et al.

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Gjoko Muratovski
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Rohit Priyadarshi Sanatani
Antoinette Lemens
Sihem BenMahmoud-Jouini
Matthieu Aquino
Stéphanie Roland
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Srini Srinivasan
Joesph Press
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